amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

DECEMBER, 1972

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Price 40 Cents

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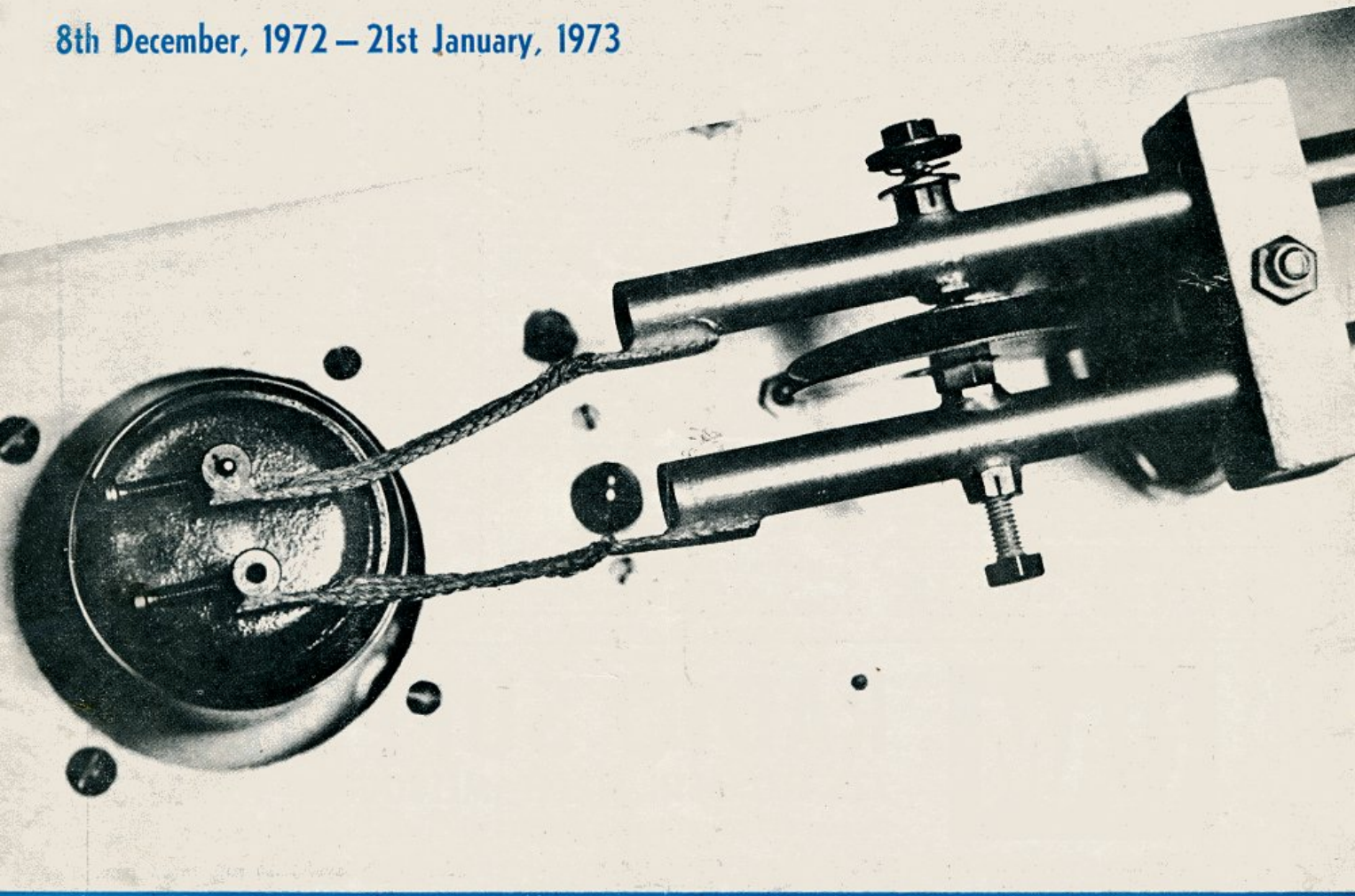
8th December, 1972 – 21st January, 1973



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MODEL A-10/P — Price $55.00

Giant 6½ inch meter. In-built signal injector, overload protected.
AC volts: 2.5, 10, 50, 250, 500, 1000 (10K o.p.v.). DC volts: 0.5, 2.5, 10, 50, 250, 500, 1000 (30K o.p.v.), 5000 (10K o.p.v.). DC current: 50 uA., 1 mA., 50 mA., 250 mA., 1 amp., 10 amps. AC current: 1 amp., 10 amps. Resistance (ohms): 10K, 100K, 1M, 100M. dB. scale: minus 20 to plus 62 dB. Signal injector: Blocking oscillator circuit with a 2SA102 transistor. Approx. size: 6½ x 7¼ x 3¾ inches.

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CONTENTS

COVER

Linear tanks are as much a part of VHF/UHF as is the Annual Ross Hull Memorial VHF/UHF Contest. This summer the contest runs from 1401 hours GMT, 8th Dec., 1972, to 1400 hours GMT, 21st Jan., 1973.

Photo: VK3YAZ and VK3ZU.

QSP

OSCAR 6

"A long and successful life".

That is what is predicted for Oscar 6 which was launched by the National Aeronautics and Space Administration at 1719 hours GMT on 15th October, 1972, from the Western Test Range, U.S.A.

The November issue of "A.R." described the telemetry, command and 2-to-10 metre repeater systems of the package. George Long, the Chairman of the Project Australis Group suggested some of the uses to which the satellite could be put. I propose to suggest some aspects of the significance of Oscar 6.

Oscar 6 is the first truly successful Amateur repeater satellite. It is more sophisticated and more efficient and will operate longer than any previous Amateur Satellite. It therefore represents a further technical advance.

Because it provides an effective repeater system available to all Amateurs it provides a service. Because of its expected life, I am sure that it will attract many Amateurs throughout the world to use techniques and perhaps frequencies that they have not used before. Thus many will acquire new knowledge. Equally, we hope that we shall all acquire new knowledge as to the design and construction of satellites and the phenomena associated with their operation.

It is significant that Oscar 6 is the outcome of co-operation between Amateurs in a number of countries, primarily the United States of America and Australia. The command system was designed and built in Australia by the W.I.A. Project Australis Group, funded by Amateurs through the Wireless Institute of Australia. We can, therefore, allow ourselves some parochial pride.

But I suggest that the ultimate significance of Oscar 6 is deeper than any of the things to which I have already referred. The Region 3 member of the I.A.R.U. team to the 1971 I.T.U. Space Conference, Tom Clarkson, ZL2AZ, has forcibly pointed out that the use to which the Amateur Service puts its bands is of considerable consequence to the many countries that are undecided as to the worth of the Amateur Service and who express their reservations in their voting at frequency allocation conferences.

The Federal Council of the W.I.A. has encouraged the Australis Project because it believes that this kind of activity is in the long term in the best interests of Amateur Radio. It represents the sort of use of our bands which can justify our continued existence. I congratulate A.M.S.A.T. and the Project Australis Group on their technical success and I also thank them and everyone else concerned with the design, construction, launch, tracking and collation of data for what they are doing for the future of Amateur Radio.

MICHAEL J. OWEN, VK3KI,
Federal President, W.I.A.

OSCAR-6

It's up! Launched 16th October, 0319 hours E.A.S.T., orbit close to that planned; going well. Numerous contacts Australia-wide, also to ZL, VK9, and VK6-ZE; JA's heard. Only major problem—switches itself off, or on, when moving into, or out of, sunlight. Planned to be commanded off, probably mid-week, for three days out of seven for battery re-charging. More data planned for January "A.R.," also listen to Divisional broadcasts, meanwhile watch out for, and report on, ionospheric scintillation when the 6 or 10 metre band is open.

"A SPECIAL FRIEND"

Yes, VK6RV is a special friend, "You may know him, he was general manager of R.S.G.B. (G3FRV) and knows how to try to manage some 16,000 members." (Quote from VK6PG)

RADIO REGULATIONS

N.Z.A.R.T's "Break-In" for September announces a special issue in Jan.-Feb. 1973 to celebrate the 50th Anniversary of the Radio Regulations.

LONG, LONG-WIRE AERIAL

W1BB's 160 metre DX bulletin No. 1 of 1972/73 (if you want it send him three I.R.C's per season) quotes a VK6 S.w.l. (Allen) as having a long wire around his yard on top of a fence about 5 feet high and mounted on insulators: "Has given most excellent account of itself on DX."

STANDARDS ASSOCIATION

The S.A.A. announces a revision being undertaken of the 1969 edition of Part 1 of the S.A.A. Wiring Rules, AS CC1, and invite constructive comments for consideration by the Committee EL/1.

S.S.T.V.

Listed 22nd in the 2nd World Slow Scan Contest, sponsored by "CQ Elektronica," held in February, was VK5MF, the only VK listed. ("CQ TV" Aug. 1972)

QUANDARY

The Publications Committee possesses splendid drawings, but no text, for the f.m. T.C.A. 1674 and an excellent article on modifications to the MR6A, but with a drawing nearly a yard in length. The problems are being worked on.

EXAMINATIONS

For those interested in this subject many would appreciate a different approach. Here is one of several questions asked in "Tuned Lines" Vo. 1 No. 1 from the N.S.W. V.h.f. and T.v. Group: "Define the universe; give three examples."

U.S. NAVAL RESEARCH LAB.

Celebrates its 50th anniversary this year and acknowledges a great debt to world-wide Amateurs for their assistance over the years. From 1st January to 16th July, 1973, the station W3NKF will call "CQ NRL", with concentrated effort from 23rd June to 16th July, using all modes including E.M.E. on 21st January and 1st April on 144.050 MHz. Commemorative QSLs will be sent out as well as a certificate award for successful S.S.T.V. and E.M.E. or for working five or more NRL Amateurs. In their circular the N.R.L. mentioned their equipment in the U.S. Fleet's visit to VK/ZL in 1925 operated by Fred Schnell, 1MD of A.R.R.L. Hqrs., as Fleet Radio Officer.

F.M. STEREO

The N.H.K. (Broadcasting Corp. of Japan) f.m. stations (342 in operation late 1971) are required to present 50 per cent. or more of their programmes in stereo and the commercial f.m. stations to include 70 per cent. or more of stereo programmes. (A. Br. Control Board Report on Frequency Modulation Broadcasting)

CALL BOOK 1973: REMINDER

If the P.M.G's Department does not have your correct address your listing in the 1973 Call Book will be wrong. You have up to the end of the month to write to them to register your correct listing for incorporation into the new Call Book.

MOBILE MANUAL

An item in "League Lines" of "QST" advises that the A.R.R.L's "Mobile Manual for Radio Amateurs" first appeared in 1955. "Over the years shifting interests . . . markedly lessened its usefulness to the Amateur and so it is being discontinued . . . to be effectively replaced by the special repeater manual now in production."

W.I.A. ADDRESS

Please note the Executive's address is P.O. Box 150, Toorak, Vic., 3142. This applies for subscriptions, "A.R.," "A.R." address changes, "Magpubs," Executive correspondence, Call Book and centralised information. **Delays or non-delivery of mail could occur if any other address is used.**

TX IDENTS.

In the editorial column of "73 Magazine" for September, Wayne Green mentions the possibility that the F.C.C. seems to be moving towards a system of automatic identification of all transmitters, by means of a built-in IC unit sending out binary blips over a period of 5 milliseconds every time the transmitter was operated.

SUBSCRIPTIONS 1973

At about the time that members receive this issue the subscriptions due notices for 1973 will also arrive. In order to avoid complications which always arise with late payments, please arrange to send in your subscription as early as possible and preferably before the end of the first month of the new year. For reasons of economy both in volunteers' time and in costs, the subscriptions are processed centrally along with membership EDP records. Please remit your subscription, therefore, **direct to: W.I.A., P.O. Box 150, Toorak, Vic, 3142.** Receipts will not be issued unless requested. Please remember that your last subscription (unless you joined, or were reinstated, during 1972) rendered you financial **only** up to 31st December, 1972.

I'VE BUILT A MONSTER

S. E. MOLEN,* VK2SG

• In this article VK2SG condenses the results of years of experimenting into a convincing argument for the multi-element, multi-band quad array. He also provides a great deal of practical information on quad construction, and (in a following article) will explain their tuning procedure.

Have you ever wanted to work DX when you wished to, and not when everyone was working it?

Have you ever had the desire to be the only station working real DX instead of just one of the pack trying to get through? Well really, it's not that hard to achieve, if one is willing to do a little work.

To achieve these results one usually thinks in terms of very large aerials. It depends of course on your interpretation of large aerials; to some people a dipole is a large aerial, whereas to others a rhombic is considered as a fair aerial. Of course, one of the considerations is that this aerial must be able to be rotated, and rhombics are sure hard to rotate! Again, the aerial must be a reasonable structure, be reasonably easy to raise in the air and fairly simple to rotate. This is all standard, but what type of aerial to use?

Before I go any further, let me point out that every type of aerial has its advantages and disadvantages, that is, considering both the structural and radiation points of view; while I might concentrate on one type of aerial, some of the structural details will apply equally to any type of aerial, so I hope some of the ideas will be useful to you all.

Fundamentally what we require is an aerial that will operate multiband, give the same gain on all bands and have a simple feed.

If we consider Yagi Antennas we immediately have the problem of multiband operation. Certainly there are multiband Yagis, but, to achieve this, they use traps, and have a variation of gain between bands. Personally, I always think of aerials with traps as rotatable r.f. chokes; maybe they are not that bad, but there are some unnecessary losses in these traps. Minute as these losses may be, they are there, and, to really work DX, every small extra amount of r.f. that you can radiate is that little more signal you can put into the DX station's receiver; and after all, this is what you are trying to do . . .

We could go through the whole gamut of aerials and point out their good points, but you can read all about these in books on aerials, and whilst we will compare several aerials we will not delve too deeply into them, but use them purely as a comparison.

* 13 Pendle Way, Pendle Hill, N.S.W., 2145.

So having said all that, what are we really trying to say? After much testing and trying various scale models of aerials at 144 MHz. on the aerial test range that I constructed in my back yard (which was luckily large enough to give a good test area), I finally settled for a 4 element quad on a 34 foot boom. This gave the best forward gain for size of any of the aerials, and even gave more gain than some that had much longer booms (and were much harder to tune). The quad also gave a very interesting angle of radiation, and could be tri-banded easily.

But before we get involved in building a 4 element quad, let us consider what the other aerials are and why we finished up with the quad.

Firstly, I will describe the antenna range and the equipment that was used to measure the results. I think you will find this of some interest.

All test aerials were mounted at 25 feet above ground, and the aerials were tilted to fire into a corner reflector at 10 wavelengths. The sides of the corner reflector were seven wavelengths long with the dipole spaced 0.25 wavelength (Fig. 1) from the corner. This aerial in itself was subject to considerable testing before it was accepted as a test bed. Across the dipole a detector

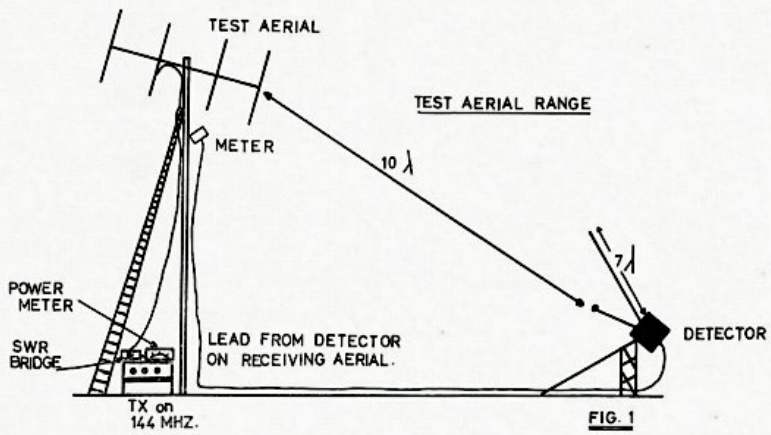

FIG. 1

was connected and the resultant d.c. voltage was then fed back to the test aerial position, so that the result of any adjustment of the aerial under test could be seen immediately. In this way one person could do all the necessary tests.

The transmitter ran 10 watts input and the output was fed through a power meter then an s.w.r. bridge to the aerial. From this it can be seen that variables were kept to a minimum and could be monitored at all times. It could be argued that firing the antenna downwards might cause false readings to appear in the receiving aerial. In fact, owing to the long "wings" on the corner reflector, there were no ground reflections measurable. By using this set-up, I was able to measure forward gain, beamwidth and angle of radiation.

With the above test range I started to test aerials. Starting with two element beams I worked my way up to the larger aerials. One could, of course, write up each aerial separately, but I feel that these are adequately covered by various aerial handbooks so I will not write a lot about them, although I will admit some very interesting figures did come from the tests.

Some of the well used two element beams certainly do not give the figures that one hears quoted on the air; for instance the "ZL Special" has been claimed to have 7 dB. forward gain. The best I could get was 4.8 dB. with 20 dB. front-to-back; not as good as a two element quad, and certainly not as good as some of the claims.

Incidentally, trying to add a reflector to a "ZL Special" is lot of fun, but is completely useless! Adding a director gives between 1.3 dB. and 2.1 dB., depending on spacing.

Actually I tested 19 aerials, Delta loops, ZL Special, Yagi, Swiss Quad, Quads in various configurations, W8JK Two-Section, and Lazy H.

Some of these aerials were discarded after the first series of tests, owing to lack of gain, poor back-to-front, or some other problem that does not come into the scope of these tests. Finally, the field was reduced to two aerials, Yagis and Quads. By the way, both the Delta Loop and Swiss Quad showed some good figures, but they both had problems that needed further attention, again beyond the scope of these tests.

So comparing Yagis and Quads became the purpose of the operation, and subsequently 2, 3, 4, 5 and 6 element Yagis were tried out, and 2, 3, 4 and 5 element Quads. You will note that while I tested a 6 element Yagi, I did not test a 6 element Quad. There is a reason for this, because while a 2 element Quad has slightly less gain than a 3 element Yagi, the 3 element Quad has slightly more gain than a 4 element Yagi. This does not appear to be so if one reads the various "gain ladders" that appear in some aerial books! But, on actual measurements, the 4 element Yagi showed a forward gain of 8.9 dB. whereas the 3 element Quad gave 9 dB. The 4 element Quad showed 10.4 dB. forward gain, the 5 element Quad 11.8 dB. and the 6 ele-

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ment Yagi 11.7 dB. Considering this, it was felt that we had gone far enough to prove the point, and had arrived at a set of basic figures which could be used as reference throughout further tests.

Having arrived at this point, it was decided to try the Quad Yagi combination. Using a Yagi driven element with a Quad reflector, the results were not very encouraging, and it really only looked like a 2 element Yagi beam. A Quad driven element with a Yagi reflector was only slightly better than a 2 element Yagi, but by stacking the reflectors so that they were parallel to the wires of the Quad element, we achieved slightly more gain than expected from a 2 element Quad. Actually, the extra gain was about 0.5 dB. Adding a director in the same form, that is stacked Yagi elements, we should find the gain is better than the 3 element Quad, because of the straight Yagi elements. But, if we consider the mechanical structure, there are certain difficulties that have to be overcome to maintain a stable beam. Of course, we could get rid of the Quad element and replace it with stacked 3 element Yagis, which, of course, is an excellent aerial.

But generally speaking, I think that stacking 3 element Yagis will present some mechanical problems that are beyond the scope of the average Amateur. Yagis present difficulties when we try to triband them, and whilst stacked Yagis appear to be an ideal aerial for single-band operation, they do have their problems. The gain of two stacked 3 element Yagis at best twice the gain of one 3 element Yagi, that is 3 dB. more, and for the extra work put into stacking and tuning, I doubt if it would be worthwhile. So we will not go any further into stacking Yagis.

Considering all the foregoing, we seem to return continually to the main features of a Quad; in other words, we have almost the same forward gain as stacked Yagis without the mechanical and matching problems; also we can triband the aerial without any loss of efficiency on any band.

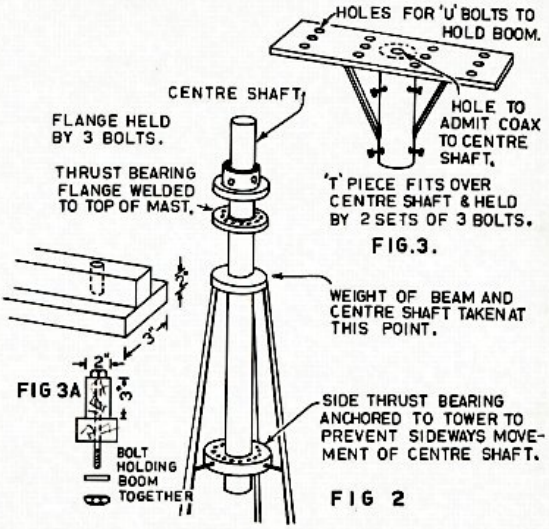
This is not exactly what we set out to prove, but what we were looking for was an aerial which gave us as many good features as possible without detracting from the results on any one band, so considering all, let us set out to build a Quad of a size to suit yourself.

KEEPING THE QUAD IN THE AIR!

One hears so much about Quads falling down, that I think I should concentrate on one main theme, and that is, how to make a Quad stay in the air! Fundamentally, if one is to build a structure one does not use glue and string! The same goes for aerials of any kind; one must build them strong enough to stand up to all kinds of winds. From experiments I have carried out, turning a 3 element Quad in a 60 m.p.h. wind requires a steady pull of four tons in a bicycle chain between 4" sprockets. This is a torque of nearly one foot-ton. In a gusty wind it will be greater, so one must construct the turning mechanism to take this torque, and likewise the centre shaft and bearings. Some of the beam rotators available on the Australian market at the present time are not designed for loads like this, and would, in a very short time, be wrecked trying to hold the beam steady, let alone trying to turn it!

So here is the first point, use the strongest, most powerful rotator that you can find; it may be more expensive for a start, but it will be cheaper in the long run. Secondly, if it can be arranged, use the rotator only to rotate the beam, not to support it. Use a separate support bearing to carry the weight of the beam; then, at the bottom of the shaft, use another bearing to hold the shaft in the centre of the mast (Fig. 2).

Having constructed the centre shaft so that it carries all the weight and yet turns easily, we must now provide a method of mounting the boom securely to the top of this shaft; there are as many methods as there are aerials, but the main idea is to transfer the downward thrust and rotational torque to as much of the centre shaft as possible, and not to transfer it all to a small welded area. My idea is to use a 'T' piece to support the boom as in Fig. 3. This way, the thrust is transferred over a three-foot section of the centre shaft and adds a safety factor.



The boom does not present any problem. For a 2 element Quad we can use 3" x 2" oregon, for 3 element we can use two pieces of 3" x 2" oregon in a 'T' configuration (Fig. 3a). Or we can use a metal boom, but the metal boom must be as strong or stronger than the oregon. Of course, the longer we make the boom the more robust it must be, and when one starts thinking of 4 element Quads, one should start thinking seriously of metal booms, as with a long boom the twisting movement becomes important.

To attach the spreaders to the boom I use an angle iron cross as in Fig. 4. I use angle iron in preference to aluminium because it is stronger, if slightly heavier, and after all, it is the strength that we are interested in rather than the weight. The clamps used must be of good quality for they have to stand weather for many years. After trying many types I use 2½" "Utilux" hose clamps, cadmium plated. These are a little more expensive than galvanised, but they certainly last much longer and are worth the extra cost. To get a good grip on the bottom of the canes, the clamped area is wrapped in plastic insulation tape. This tape has a certain amount of compressibility, and in this way the clamps do not shift even after years in the air.

Regarding the spreaders, these are Rangoon Cane. They could be made of fibreglass, which would be excellent, if more costly, but whichever is used, they will need to be treated against weather. I gave the canes four coats of epoxy resin spread over a four-week period, then four coats of white hard gloss exterior enamel. These canes lasted nine years before they were taken down and even after that time, some of them could have been used again.

Treating the canes with fibreglass should be successful, but I have not, as yet, seen any canes treated this way

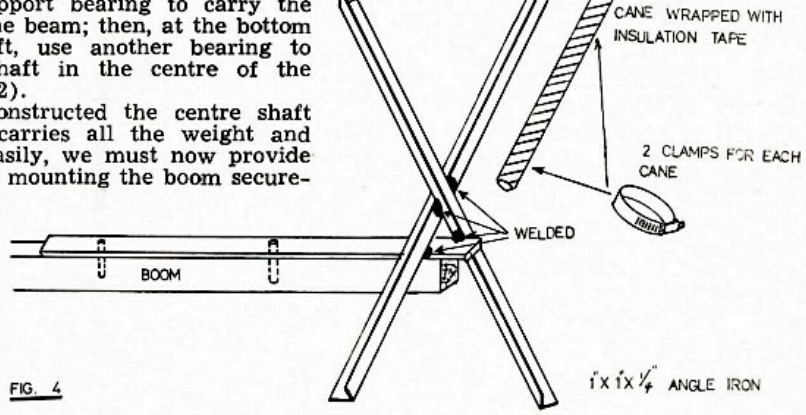


FIG. 4

that look smooth and neat, nor do they seem to last for more than four or five years. Of course, this may be the fault of the people using the fibreglass rather than the material itself! Some people have tried using wooden dowels as spreaders, but these have never been successful, because they are not flexible enough to stand up to the winds and weather, are much too brittle, and will snap at the most inopportune moment, irrespective of how they are treated!

Of course, one could use metal spreaders. A problem, however, if the spreaders are made of one section metal tube, is that the length will be 12 feet from centre to tip and will resonate on 15 metres as well as detracting from the performance on other bands. We can overcome this problem by splitting the spreaders into lengths of 6 feet or less and using a high grade insulation between segments, such as "Teflon". Make sure that all joins are weather tight, and that the metal used for the spreaders has sufficiently high tensile strength to withstand the whipping in the wind. It would be fairly useless to use thin walled soft aluminium tubing, so if you are going to use aluminium make sure it is hard-drawn and has sufficient strength. Because of the mechanical problems associated with the use of metal spreaders I tend to prefer treated cane or fibreglass.

While discussing spreaders, let us consider how we are to attach the wires. If we tie the wires directly to the spreaders and do not allow them to move, we will eventually finish up with broken wires caused by metal fatigue. To overcome this problem, I have used egg insulators wired to the spreaders in such a way that the wires of the elements can run freely through the insulators (Fig. 5), and whilst the Quad looks a bit untidy in a heavy wind the wires don't break and the Quad always looks normal after the wind drops, as we want it to do!

For element wire I used 7/0.029 semi hard-drawn copper; this is good substantial wire with a fair flexibility. One could use heavier or thinner wire to suit the circumstances, but do not use hard-drawn or stiff wire. If you want to discover why, try holding some differently annealed wires in a vyce and bending them back and forth. You will find that the stiffer wire will always break first, so the more flexible the wire is, the longer it will last. The size of the wire is your choice, but if one goes to the ridiculous and uses 36 gauge soft drawn copper, one can only expect it to break in the first light breath of air!

CONSTRUCTION

So now we have all the hardware for the Quad and we can start to construct it. This is the point where a lot of people run into trouble, in that they try to construct all the elements at the same time, which will take up considerable space on the ground. Actually the whole thing can be constructed in a 17-ft. square if we use the space correctly. Instead of constructing all the elements together, if we construct them one at a time, we only need one square area to do the job. If we tie the boom on to the side of the tower at about 11 feet above ground, we can lift each element up on to the boom as we finish it and get it out of the way. This can be a risky procedure, for, if care is not taken, it is very easy to break the spreaders and lose the whole element; but if the element is lifted by the centre spider using a light pole, say, 20 feet long, we can lift the element easily and hang it on the boom (Fig. 6). It's as easy as that; as each element is made and hung on the boom, it can be bolted into place, for when we have all the elements constructed we may start our tuning at this height.

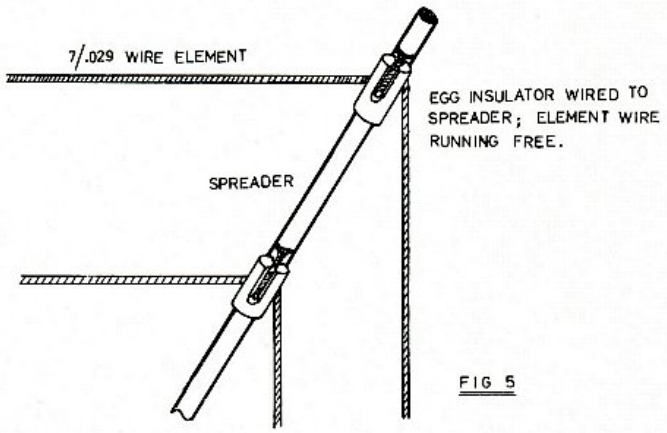


FIG 5

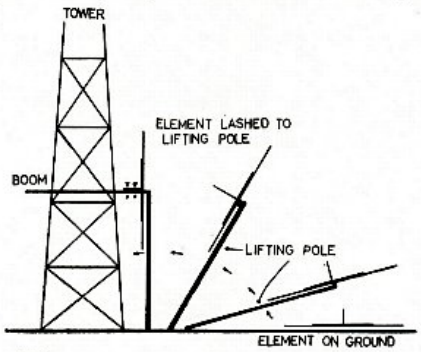


FIG. 6

Here we arrive at the point, how many elements are we going to use? Let us consider the radiation pattern of various numbers of elements, both in the vertical and horizontal plane. As you can see in Fig. 7, the 2 element Quad has a 60° beamwidth with a 17° (Fig. 8) angle of radiation. It also has 5.8 dB. forward gain, whereas the 3 element Quad has a 44° beamwidth, 12° angle of radiation and a forward gain of 9 dB. The 4 element Quad has a beamwidth of 27°, an angle of radiation of 9° and a forward gain of approximately 10.4 dB. Now if we add another element to make it five, the beamwidth is 20°, the angle of radiation is 7.5° and the forward gain 11.6 dB. [Note: The angle of radiation will also be a function of the aerial height above ground.—Tech. Ed.]

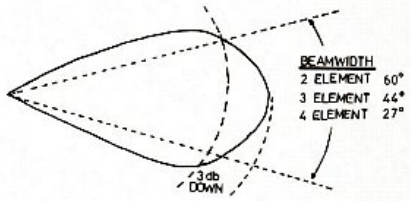


FIG 7 HORIZONTAL PATTERN (Major lobe)

So from these figures you can make up your own mind as to the number of elements you are going to use, and accordingly the size of the aerial you are going to construct.

Regarding the tuning stubs in both the reflector and directors, these may be constructed in various forms, such as inductances or condensers, neither of which I favour, owing to several factors. One is the weight of the coils and/or condensers, another is that the solder joints at these points tend to get brittle after being in the weather for some time under continuous stress. Whereas by using stubs, these are tuned and cut and will not vary due to weathering or break because of movement. After much experimenting, it was found that if we used half the stub in the top of the element and the other half in the bottom, we arrived at a much better electrical balance for the whole aerial. It is not necessary to tune the top stubs provided they are made half the estimated length of the complete stub; then if we tune the bottom stubs we will find that the element will tune as normal with a better electrical balance than is obtainable with only the bottom stubs. If you only use stubs at the bottom of the elements, the quad will still work very well, but it will not be as well balanced, electrically. If you carry out tests you will find that, if you use both top and bottom stubs, the angle of radiation will come down appreciably, depending upon the number of elements you use; but irrespective of the number of

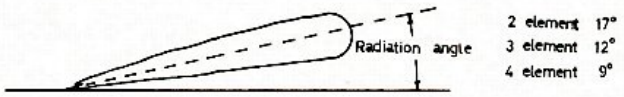


FIG 8 VERTICAL PATTERN (Major lobe)

elements, the lowering of the angle of radiation is worth the effort of putting the extra stubs in your aerial.

So having constructed the reflector and director elements, let us now consider the driven element. This element is the same size as the reflector and directors, but instead of having stubs it is made as a complete loop. Then if we use gamma matching we can feed the element irrespective of its impedance. Also, with gamma matching we can feed three bands with only one feed line and without any peculiar interaction between bands, and still indicate a good s.w.r. on these three bands. The construction of the gamma matching is fairly simple. Fig. 9 is the single-band gamma match. The length of the gamma bar, the size of the condenser, and the spacing of the gamma bar from the element depend on the frequency in use.

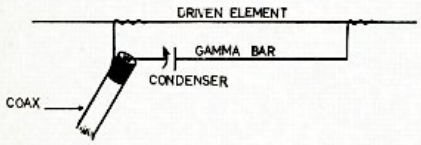


FIG 9 ONE BAND GAMMA MATCH

Using gamma matches with Quads for more than one band, requires only one feed line if we position it correctly. If we place the feed line half way between the highest and lowest frequency feed points and connect the gamma condensers by an open wire 300 ohm line it will be found that each can be easily tuned. A warning here, do not connect the gamma condensers with co-ax as the capacity of co-ax. is sufficient to prevent properly tuning the gamma condensers. If the 300 ohm open wire is constructed as in Fig. 10, the condensers and the gamma bars will all be supported by the 3" x 1" pine which is attached to the boom.

Incidentally, the safest way to lead the feedline down to the shack without it tangling around the mast, etc., is to run it down the centre of the rotating shaft; then you will be able to turn the Quad more than 360° without fear of the co-ax. getting caught on the mast and breaking.

That is all the hardware and construction details. All that is left is to give a few measurements. Firstly, the boom length. Most people use an element spacing of 8 feet. Maybe this is fair enough for 10 metres, but if you

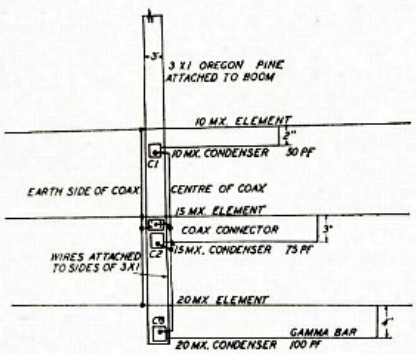


FIG 10 3 BAND GAMMA MATCH

are using 20 metres the spacing will be much better at 11 feet 6 inches. This will give a much better beamwidth and slightly better forward gain. As for 10 and 15 metres, this spacing will be slightly more than optimum and thus the gain slightly less, but as the loss is only about 0.3 dB. it is not worrying.

Owing to the increased spacing we have closed the beamwidth by a few extra degrees and therefore the apparent gain at the receiving point could be greater than expected. On tests carried out on the antenna range, it was not until 0.5λ spacing that there was any loss of signal and, even so, this was only about 0.5 dB. At this point, on a two element Quad, the beamwidth is about 50°, so that in effect we have overcome the 0.5 dB. loss by increasing the spacing. Of course, after we pass 0.5λ spacing the gain drops rather dramatically, and even though the beamwidth closes further, it does not overcome the loss. As 11 feet 6 inches is less than 0.5λ spacing we do not have this problem, and it is possible to use this spacing for a triband, two, three, or four element Quad, and still obtain better than average results.

The length of the sides of the element varies according to which book one reads! Personally, I use the following measurements:

20 mx	16 feet 9 inches
15 mx	11 feet 4 inches
10 mx	8 feet 7 inches

Gamma Bars:

20 mx	38 inches
15 mx	27 inches
10 mx	18 inches

Gamma Condensers:

20 mx	100 pF.
15 mx	75 pF.
10 mx	50 pF.

Reflector/Director Stubs:

20 mx, 15 mx, 10 mx } Same length as gamma bars. Half length top and bottom.

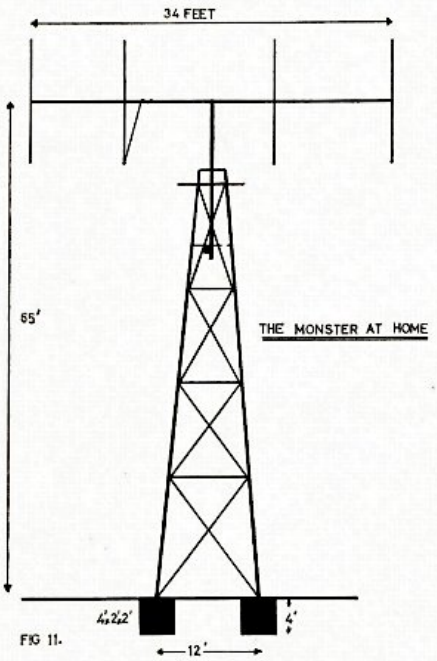


FIG 11.

Finally, to give you some idea of actual performance as compared with a dipole, consistent testing at various times throughout the night and day and allowing for inconsistency in reporting actual S meter readings, has proved that the Quad when "aimed" accurately, gives consistent reports of 26 dB. above the dipole at the DX receiving point which varied from 10,000 to 15,000 miles.

Also, tests carried out against triband Yagis, without giving any indication that they were tests (because of the possibility of people trying to help by giving exalted reports) have indicated a consistently better signal by 12 dB. I think this, in itself, speaks for the efficiency of the beam.

One final thought, if you think this is a big beam, well there is at least one much better. On South America to Sweden point-to-point service they use a 25 element Quad on 11 MHz. with a 254-foot boom on a 184-foot tower and they feed it with 50 kW. Now that, I calculate, to have 32 dB. gain, beamwidth of approximately 5° and about 3° angle of radiation. I wonder; if I put my house on the street and bought the houses on either side, re-possessed the school yard at the back; I wonder? ●

THE NATIONAL FIELD DAY IS
12th and 13th FEBRUARY, 1973

BUILDING MODERN FILTERS

PART TWO

*By "CABBAGE-TREE NED"**

We are justified for our purposes in using the specialist's terms simply as a shorthand if they save wordiness later. So, having seen (Part One) that a synthesised filter is one designed as a whole, let us further agree that:

(a) **Maximally-flat** (or Butterworth) means constant level of response over most of the pass-band, falling smoothly through the 3 dB. point of nominal cut-off.

(b) **Equal-Ripple** (or Chebyshef) means a filter permitting some ripples in the pass-band for the sake of getting much greater skirt-steepness.

(c) **Complete-Ripple** (or Elliptic) is an equal-ripple filter with an optional extra in the form of very useful peaks of attenuation in the stop-band.

(d) **Order of Filter** is the number of sections (each of which may be a parallel-pair or a series-pair) as occurs in the Butterworth bandpass.

SPECIFICATIONS—STATING WHAT YOU WANT

The filters we aim at are sufficiently described if any **three** of the following four quantities are stated:

(a) Ratio $f_s \div f_{co}$, which defines the skirt steepness (f_s is the frequency at which the desired number of dB attenuation is first reached).

(b) Order of Filter, N: i.e. number of elements or sections.

(c) Maximum Allowable Ripple in the pass-band: A_{MAX}.

(d) Minimum Attenuation needed in the stop-band: A_{MIN}.

NORMALISING

This is simply a process of scaling both impedance and frequency to more convenient values, so that **one set** of tables or graphs will serve to find the L and C values for **any** filter of a given type.

The normalised element-value in the tables is to be thought of simply as a reference-value.

For instance, the only difference between a 1 kHz. filter and a 10 kHz. filter is that all L and C values are 10 times as large in the 1 kHz. model as the 10 kHz. model. Similarly, on the impedance score, the element values in a 100-ohm filter differ from those in a 300-ohm filter only by a numerical factor, 3 in this example.

Most conveniently the tables normalise element values as if the filter were working into a 1-ohm load, with a cut-off frequency of one cycle/sec. (Hz.).

Then, to obtain the real circuit values we "de-normalise". That is, we must:

(a) Divide all L and C by the actual frequency;

(b) Multiply all R and L values by the actual impedance;

(c) Divide all C values by the actual impedance.

In symbols:

$$L_{ACTUAL} = L_T \frac{\text{Actual Impedance}}{\text{Actual Frequency}}$$

$$= L_T \frac{Z}{f}$$

$$C_{ACTUAL} = \frac{C_T}{f\,Z}$$

where the subscript $_T$ means normalised or table values.

IMPEDANCE MATCHING

All lossless filter circuits can be designed to work for any chosen ratio of output impedance to input impedance, but different ratios imply different element values.

Hence to be realistic as to size of table, we must severely limit our choice to suit only the most common needs. Thus our tables will provide only for two types of filter impedance:

(a) **Voltage Source**: Implying low source impedance and hence a "stiff" voltage that changes negligibly as load alters. Here the tables are for R_S (source) = 0, and R_{LOAD} = 1.

(b) **Power Source**: Maximum power transfer is required. Hence R_S = 1 ohm = R_L in the tables.

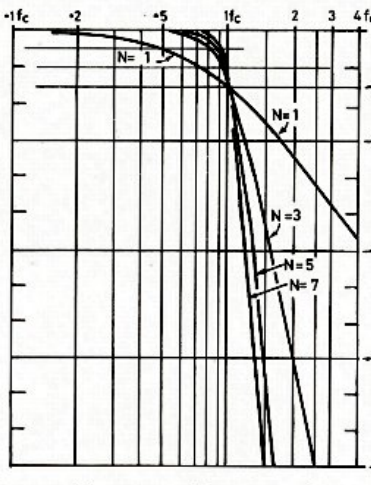


Fig. 1.—Frequency Response (attenuation v. frequency) of Butterworth Low-Pass Filters.

f_c = Cut-off Frequency.

N = Number of Elements.

If the response must be flat within, say, 1 dB. to a given frequency, f_c will have to be considerably higher, e.g. if a 3 element filter is to be not more than 1 dB. down at 15 kHz., the curves show that 15 kHz. must occur at 0.8 of f_c, so we make f_c = 19 kHz.

VITAL PRECAUTIONS

The user must observe the following two rules if he is to reap the reward of predicted performance:

(a) A filter will only operate properly when driven from its proper source, and into its designed load. Failure to do this almost invariably worsens the performance.

(b) Do not use ordinary commercial r.f. chokes. Wind the coils in self-shielding pot-cores, and use polystyrene, mica, or polycarbonate capacitors, or back-to-back tantalums for the large C values often required at very low audio frequencies (few hundred Hz.).

MAXIMALLY-FLAT FILTERS (Fig. 1)

Low-Pass and High-Pass

The rate of change of attenuation of the sloping **skirts** of the response is 6N dB/octave, where an octave means a doubling of frequency, and N is the order of the filter (or number of elements).

Thus the flat filter of the last article had five elements, as it was needed that the skirt should slope or fall 30 dB. within 1 octave of the cut-off frequency of 3.5 kHz. That is, frequencies beyond 7 kHz. should be down in magnitude by a factor of 1,000 in power.

Band-Pass

The important notions are:

Bandwidth = B-W = $f_H - f_L$ = high freq. cut-off — low freq. cut-off.

Centre frequency = f_{CN} is the geometric mean of the upper and lower 3 dB. or cut-off frequencies.

It appears further on as: $f_{CN} = f_H f_L$.

The B-P filter is commonly composed of:

(a) Series-connected L and C in the series arm;

(b) Paralleled L and C in the shunt arm.

If these pairs of elements are chosen to be resonant in the pass-band, the series-arms will be low impedance and often no opposition to the transmission of signal, while the shunt arms will be high impedance and prevent leakage of the signal through a path parallel to the load.

On either side of the pass-band, of course, both series and shunt arms will prevent signal from reaching the load —as desired in a B-P filter.

PERSPECTIVE

The writer freely admits, by the way, that the simplest—where it will do the job—is the best. The double-tuned transformer adjusted for critical coupling is the simplest of all approximations to maximal flatness. Hence its

* VK3ZRQ, A. G. Birch, 5 Harrison Street, Bendigo, Vic., 3550.

use in commercial apparatus unless more exacting requirements demand a more costly filter.

Example 1

Consider a typical set of filters to provide band separation at audio frequencies, as in a cross-over network:

Specifications:

3 dB. cut-off frequencies—
LP 500 Hz.
HP 1500 Hz.
B-P: $f_L = 500$ Hz.
$f_H = 1500$ Hz.

Skirt steepness: Response is to fall off by 18 dB. within 1 octave of cut-off.

Impedance: Filter is to work from a voltage source into an 8-ohm load.

Solution: Since 18 dB. must equal 6N dB., we must have $N = 18 \div 6 = 3$ sections.

Low-Pass Section

Since the signal source is a voltage type, enter Table 2, voltage-source filters, at $N = 3$, and read off the normalised values of L and C.

As directed earlier, de-normalise these figures to obtain the real circuit values:

$$L1 = \frac{0.238 \times 8}{500} = 1.272 \text{ mH.} = 1.27 \text{ mH. (approx.)}$$

$$L2 = \frac{0.0795 \times 8}{500} = 3.808 \text{ mH.} = 3.81 \text{ mH. (approx.)}$$

$$C = \frac{0.212}{500 \times 8} = 53\ \mu\text{F.}$$

Transforming the Low-Pass to a High-Pass or Band-Pass Model

This may seem like gambling that a ghost will turn out to have substance. Nevertheless, it can be shown quite rigorously that the pictorial summary given in Table 1 presents a valid set of instructions.

Following the Table, we shall transform the LP filter of the last paragraph into a HP section, and a band-pass section in that order.

TABLE 1 TRANSFORMATION RELATIONSHIP

FILTER TYPE	SERIES ARM	SHUNT ARM	COMPLETE FILTER AND EQUATIONS
LOW PASS	Lt Normalised values	Ct	Lt, Ct, L1
HIGH PASS	C	L	C1, C2, L; $L = \frac{1}{40 f_c C_t}$; $C = \frac{1}{40 f_c L_t}$
BAND PASS	Ls, Cs; $f_{cn}^2 = f_h' f_l'$	Cp, Lp; $C_p = \frac{C_t}{B-W}$	Ls, Cs, Cs, Ls, Cp, Lp; $L_s = \frac{L_t}{B-W}$; $C_s = \frac{B-W}{40 f_{cn}^2 L_t}$; $L_p = \frac{B-W}{40 f_{cn}^2 C_t}$

NOTE : 40= approx $(2\pi)^2$ with 1% error

High-Pass Section: Find, in Table 1, the two simple instructions for transforming the normalised low-pass L-value into a high-pass C-value, and similarly the low-pass C-value into a high-pass L-value. The f_c-value appearing in these two instructions must, of course, be the proper HP cut-off frequency, here 1500 Hz. The L and C values so obtained must be finally scaled by the impedance factor as shown in the tabulated calculations of Table 1A for our filter.

The resultant cross-over network is shown in Fig. 2.

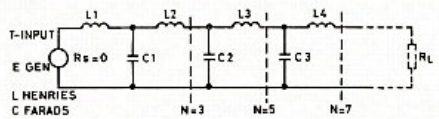
(Continued on Page 19)

Normalised L-P Values	H-P Values for 1 Ohm		Real-Circuit Values for H-P
$L_{T1} = 0.238$ H.	$\frac{1}{0.238 \times 1500 \times 40}$	$= 70.2\ \mu$F. $= \frac{70.2}{10^6}$ F.	Divide by Z = 8 (because we are finding a capacitance). Obtain C1 = 8.8 μF.
$L_{T2} = 0.0795$	$\frac{1}{0.0795 \times 1500 \times 40}$	$= \frac{210}{10^6}$ F.	Scale for Z = 8. Obtain C2 = 26.2 μF.
$C_T = 0.212$	$\frac{1}{0.212 \times 1500 \times 40}$	$= \frac{0.0785}{10^3}$ H.	Multiply by Z = 8, since we are finding an inductance value. Obtain L = 0.628 mH.

Table 1A.

Band-Pass Section:			(Multiply L's by 8) (Divide C's by 8)
L_{S1} =	$\frac{0.238}{1000}$	= 0.238 mH.	1.9 mH.
C_{S1} =	$\frac{1000}{40 \times 750{,}000 \times 0.238}$	$= \frac{1}{7.14 \times 1000}$ = 140 μF.	17.5 μF.
L_{S2} =	$\frac{0.0795}{1000}$	= 0.0795 mH.	0.636 mH.
C_{S2} =	$\frac{1000}{40 \times 750{,}000 \times 0.0795}$	= 420 μF.	52.5 μF.
L_P =	$\frac{1000}{40 \times 750{,}000 \times 0.212}$	= 0.157 mH.	1.26 mH.
C_P =	$\frac{0.212}{1000}$	= 212 μF.	26.5 μF.

Table 1B.



Filter Order N	Element Values	L1	C1	L2	C2	L3	C3	L4
3		0.238	0.212	0.0795				
5		0.245	0.269	0.220	0.142	0.049		
7		0.248	0.268	0.263	0.222	0.168	0.104	0.0357

Table 2.—Voltage Source

Filter Order N	Element Values	L1	C1	L2	C2	L3	C3	L4
3		0.159	0.318	0.159				
5		0.0983	0.258	0.318	0.258	0.0983		
7		0.0708	0.199	0.286	0.318	0.286	0.199	0.0708

Table 3.—Matched Filters (R_S = 1 ohm = R_L)

Commercial Kinks

With Ron Fisher,* VK3OM

THE FT200, Part 4

It seems that FT200 mods will go on for ever, at least I rather hope they will. Two letters just to hand are from Phil VK5NN and Kerry VK5SU, both of whom report on modifications and adjustments they have made. First off, over to Phil.

"Further to the valuable material already published, there are several matters which appear to require attention and for which solutions are not yet available. Everybody wants information, but it seems most are quite happy to wait for Yaesu to come out with new mods for all to copy. I am numbered with the many as time is at a premium, but here are a few tips on the adjustment of the FT200 which may overcome common defects:

Balancing of Product Detector Injection

"After replacement of L106 in the cathode of the product detector V102 by a 10K resistor, the set sometimes lacks sensitivity, and even on some unmodified sets there are complaints of this; also the fact that the S meter gives different readings on the various bands. It has been found necessary to re-balance the b.f.o. injection by adjusting C165. This, of course, is difficult as this component is only a few pF. of twisted wire between pins 2 and 8 of V102 (12AX7). This may be done by putting in two pieces of wire ½" longer than the original ones, but as the adjustment is best done by reducing capacitance, a 1-4 pF. trimmer is preferred. A small 'Polar' concentric capacitor was used with 40% of the plunger screw removed.

"To adjust correctly, first remove the antenna co-ax plug and switch to 21 or 28 MHz. Screw in C165 until there is an increase in the S meter reading due to an excess of b.f.o. signal on the a.g.c. tube. Now slowly reduce C165 to the point where the S meter is just back to zero. You can hear the receiver sensitivity come up to maximum. The calibrator may be used as a strong signal source on 3.6 MHz. and a weak signal source on 28 MHz. This adjustment is recommended to those who have complaints about the FT200 S meter.

Setting the BFO/Carrier Oscillator Frequencies

"Most FT200s and FT101s give very good clean signals when seen on a spectrum analyser, but there are some that sound rather low pitched and the speech is therefore indistinct. The manual simply says that the carrier crystals should be adjusted for best speech quality, but gives no instruction as to how this is best done.

"The filters employed in these transceivers are not always symmetrical, but are good enough to produce good crisp speech on all bands with either upper or lower sideband. The filter has three peaks, the outer two about 1.8 or 1.9 kHz. apart and the third somewhere in between. There may be 6 to 8 dB. of difference between them, but this appears to be of little consequence.

"Setting the carrier crystals can be done by means of a plastic knitting needle sharpened as a screw driver to go between the slots in the top cover for adjusting the trimmers adjacent to the carrier crystals. Remove the antenna plug, zero the S meter and use the calibrator crystal as a signal for alignment on the 3.6 MHz. band. Tuning through the signal the peaks should appear at about 600-700 Hz. for the lower one and 2400 Hz. for the upper one. Adjust the r.f. tuning for a 20 dB. over S9 indication on the S meter, then tune down in beat frequency until zero beat gives a pulsation on the meter between S3 and S5, dropping to zero as the beat note rises in pitch when the signal slides further down the skirt of the pass-band.

"Repeat with the sideband switch in the reverse position, adjusting the input signal lower peak to 20 over S9 again if the peaks are not symmetrical—as usually they are not. Re-adjust the carrier frequency trimmers until you achieve a result something like the above for both the normal and reverse sidebands. The zero beats should then be about 3 kHz. apart on the main dial.

"Similar tests may be done with many other makes of equipment with worthwhile results. This test costs nothing and requires no test equipment. If you have either an audio signal generator, piano, or even a guitar, you can check where the peak frequencies lie. The lower peak is about D sharp or E above middle C, and the upper peak two octaves higher.

"This series of adjustments will change the sound of a transmission from what could best be described as muffled, to one which can be said to have 'presence' even with only 2.7 kHz. of band width."

* * *

Over now to Kerry VK5SU who has worked out a few very simple but interesting modifications.

Peak-Reading Type of Meter

The action of the meter can be slowed down and made into a peak-reading type by connecting a 100 μF. electrolytic condenser across the meter terminals. As the voltage across the meter is very low, a ten-volt working type would be quite large enough.

Kerry reports that the a.l.c. indication is now slowed down and easier to read.

Sensitivity on 28 MHz.

Sensitivity is a problem on the 28 MHz. band. Kerry makes the suggestion that amongst other things the oscillator injection at the 6U8 is insufficient, and that perhaps a buffer amp. after the heterodyne oscillator could be tried. However, one way round the problem is to substitute a 6GM6 for the 6BZ6 r.f. amplifier stage. The 6GM6 has a gm. of 13,000, quite a bit up on the 6BZ6. The following changes need to be made to the circuitry round the r.f. stage.

(a) A resistor of about 66 ohms across the 6CB6 filament which is wired in series with the new 6GM6, to balance heater voltages.

(b) Replace the existing 100 ohm cathode resistor R25 with one of 56 ohms.

(c) Replace R32 1K ohm decoupling resistor with one of 1.5K ohms in order to bring the h.t. down to 125 volts for the 6GM6.

(d) Wire a 3.9K ohm resistor in parallel with R24, the 15K ohm screen divider, to increase to 125 volts the voltage on the 6GM6 screen.

Finally, Kerry passes on a hint to improve the insulation of the e.h.t. wiring. After an h.t. short one night, Kerry traced the fault to the bolt holding the r.f. choke in the final compartment. The bolt was just long enough to cause an arc to the lug anchoring one end of the r.f. choke winding. Cure: Put a spacer washer under the choke.

Kerry is also the proud owner of an FT-DX401 and with a bit of luck might be tempted to come up with a few ideas on this set in the near future.

* * *

I seem to run out of space each month, just when I really get going. In other words, the Trio modifications will have to wait until next month. To all those who have written to me for carphone circuits, I am getting these out as fast as I can, however sometimes there is an unavoidable delay of a week or two before I can arrange copying of them.

* 3 Fairview Avenue, Glen Waverley, Vic., 3150.

NEW TRANSCEIVER FROM YAESU!

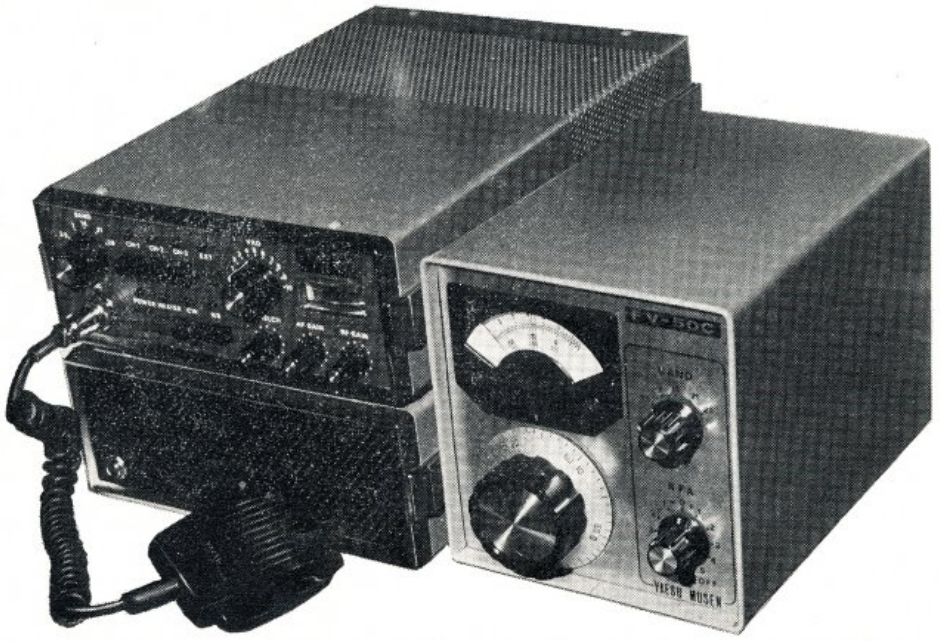
MODEL FT-75

Compact,

Solid State,

80-10 mx,

SSB and CW



This small size Transceiver, with a choice of FP-75 AC Power Supply or DC-75 DC-DC Converter, enables home station or mobile installation in a minimum of space. All solid state except transmitter driver 12BY7 and PA 12DQ6 valves. PEP output, 30 watts max. Tappings on the power transformer HT secondary enable transceiver power to be reduced if required. The transceiver is crystal controlled, with VXO to pull crystal frequency a few kHz., from approx. 3 kHz. on 80 mx to 15 kHz. on 10 mx. Optional VFO, type FV-50C, available for full coverage home station use.

Pre-tuned driver and PA circuits reduce controls to a minimum; just switch on, press the mic. button and talk! Simple and safe mobile operation. Noise blanker and squelch incorporated.

Makes an ideal exciter for VHF transverter.

Three crystal channel capability for each band, with three push button channel selector switches, plus one for VFO selection. One crystal is provided for each band except 20 mx. Extra crystals available.

Sidebands are automatically selected: LSB 80 and 40 mx, USB 20, 15 and 10 mx.

Front panel: Bandswitch, eight push buttons for crystal selection, ext. VFO, and power control switching; VXO control, meter, mic. socket, noise blanker, squelch, AF gain, and RF gain.

Rear panel: Antenna, power, and VFO sockets; meter switch.

Meter functions as S meter on receive, PA cathode current or relative RF output on transmit. Panel lights indicate channel or switch in use.

Separate heater switch enables reduction of current drain on battery operation, when receiving only.

Transceiver includes a PTT mic., antenna plug, key plug, and four crystals for 3565, 7085, 21400 and 28550 kHz. A total of 15 crystals may be installed, three for each band.

See review article, September 1972 "Amateur Radio".

SPECIFICATIONS

Transmitter power input, 60 watts max.

Transmitting modes, SSB and CW.

Antenna impedance, 50 ohms unbalanced.

Carrier suppression, better than 40 dB.

Sideband suppression, better than 40 dB. at 1 kHz.

Transmitter audio bandwidth, 400 - 2700 kHz., plus or minus 3 dB.

Crystal filter, 5173.9 kHz.

Receiver sensitivity, better than 0.5 uV. for 10 dB. S/N.

Image ratio, better than 50 dB.

Selectivity, 2.3 kHz. at —6 dB.; 4.5 kHz. at —60 dB.

Audio output impedance, 4 ohms.

Audio output power, 1.8 watts at 10% dist.

Operating voltages: FP-75 (AC PS), 117v. or 234v. AC 50-60 Hz.
DC-75 (DC PS), 13.5v. DC neg. earth.

Current drain on DC:
Receive (heaters off), 0.3 amp.
Receive (heaters on), 1.4 amp. Transmit peak, approx. 6 amp.

Valves & semiconductors: 2 valves, 16 transistors, 6 FETs, 3 ICs, 23 diodes.

Dimensions:
FT-75, W 210 mm. (8¼") x H 80 mm. (3") x D 300 mm. (12").
FP-75, W 210 mm. (8¼") x H 80 mm. (3") x D 300 mm. (12").
DC-75, W 210 mm. (8¼") x H 65 mm. (2½") x D 170 mm. (6¾").

Weight:
FT-75, 3.8 Kg. (8½ lb.); FP-75, 4.5 Kg. (10 lb.); DC-75, 1.46 Kg. (3½ lb.).

Cabinet finish: two tone grey, silver edging.

Both power supplies have built-in speakers, with black Arlon cloth grille; and power cables with high quality multi-contact plugs attached. DC-75 includes a mobile mount bracket.

PRICES: FT-75 $289. FP-75 $49.90. DC-75 $49.90. FV-50C $39.90.

All Prices Inc. S.T. 90-day warranty. Freight is extra. Prices and specs. subject to change without prior notice.

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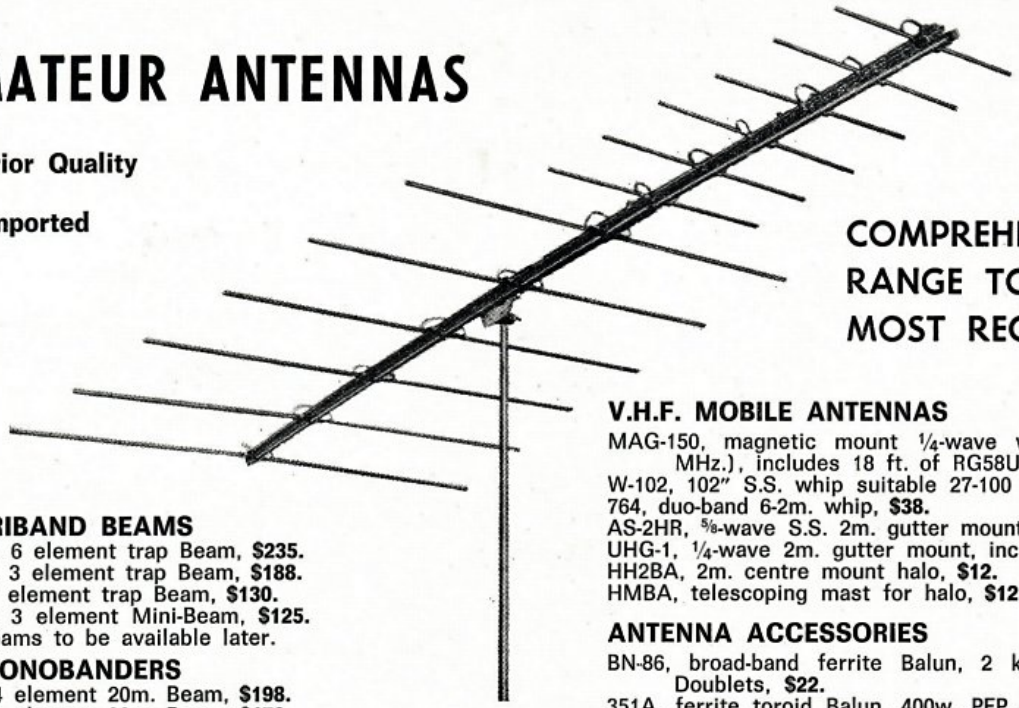

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TH3Jr, 3 element trap Beam, **$130.**
B24-RK3, 3 element Mini-Beam, **$125.**
Quad Beams to be available later.

H.F. MONOBANDERS
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203BA, 3 element 20m. Beam, **$178.**
153BA, 3 element 15m. Beam, **$85.**

H.F. VERTICALS
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18AVT, 10m. thru 80m. trap Vertical, **$88.**
12AVQ, 10m. thru 20m. trap Vertical, **$42.50.**

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HMM, mobile mast assembly, **$23.50.**
MC Series coil and adjustable tip-rod assemblies:

MC-75, 80m., **$26.95**	MC-15, 15m., **$18.00**
MC-40, 40m,. **$24.50**	MC-11, 11m., **$17.00**
MC-20, 20m., **$21.50**	MC-10, 10m., **$16.00**

Helical:

HW-80, 80m., **$25.00**	HW-15, 15m., **$20.00**
HW-40, 40m., **$23.50**	HW-11, 11m., **$20.00**
HW-20, 20m., **$21.50**	HW-10, 10m., **$20.00**

Fittings:
BPR, bumper mount, **$15.**
BDYF, heavy duty adjustable body mount, **$13.50.**
HWM-1, fixed body mount, **$12.50.**
MM-1, single hole light weight swivel body mount, **$8.**
SPG, heavy duty spring, **$10.**
SPGM, light duty miniature spring, **$6.50.**
QD, quick disconnect accessory for mobile whips, **$6.**
JMS, "Jiffy" body mount, **$9.**

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GP-50, 25 thru 54 MHz. ground-plane, **$25.**
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A144-7, 7 element 2m. Beam, **$21.**
A144-11, 11 element 2m. Beam, **$29.50.**
A144-20T, 20 element 2m. "Twist" Beam, **$59.50.**
Also available, 52 and 430 MHz. Beams.

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MAG-150, magnetic mount 1/4-wave whip (108 thru 450 MHz.), includes 18 ft. of RG58U and connector, **$25.**
W-102, 102" S.S. whip suitable 27-100 MHz., **$12.**
764, duo-band 6-2m. whip, **$38.**
AS-2HR, 5/8-wave S.S. 2m. gutter mount, inc. co-ax., **$28.**
UHG-1, 1/4-wave 2m. gutter mount, inc. co-ax., **$16.50.**
HH2BA, 2m. centre mount halo, **$12.**
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BN-86, broad-band ferrite Balun, 2 kw., for Beams and Doublets, **$22.**
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355C, ferrite toroid Balun, 400w. PEP, 52U/25U, **$10.50.**
353B, ferrite toroid Balun, 400w. PEP, 75U/75B, **$9.50.**
LA-1, Lightning Arrestor, for installation in standard 52 or 72 co-axial feedline, designed to Mil. specs., **$29.90.**
LA-2, smaller size co-ax arrestor, **$8.75.**
C1, Centre Insulator, for Doublets, **$9.50.**
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SWR-2, SWR Bridge, 50 ohm, dual meter type, **$20.**
ME-11-K, SWR Bridge, 50 ohm, dual meter, large size with calibrated power meter, **$29.**
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OTHER ACCESSORIES
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Time Recording Meter, HM-1, AC operated, 0-100,000 hr., **$8.**
MC-22s, Katsumi Speech Compressor, **$28.**
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AR-22R, low cost Rotator, 220v. AC, **$58.**
HAM-M, heavy duty Rotator, 220v. AC, **$165.**
HY-GAIN 400 Rotator, for the big beams and stacked arrays, 110v. AC, **$289.**
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Heavy duty Noise Filters also available for marine use.
PTT Microphones, Taylor (U.S.A.) Car Compasses and Altimeters.
Co-axial Cable and Connectors also available.

All Prices include Sales Tax. Freight is extra. Prices and specs. subject to change without notice. Immediate availability is dependent on stock position at time of order.

Add $1.00 P.P. on small items, clocks, switches, etc. Larger items, sets, antennas, etc., are despatched air freight interstate, rail intrastate. Write us for quote.

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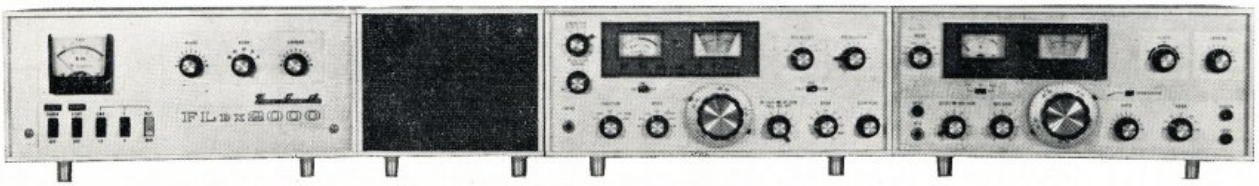

FL-2000B Linear Amp. 80-10 mx, G.G.

SP-400 Speaker

FRDX-400 Receiver 160-10 mx, WWV, C.B.

FLDX-400 Transmitter 80-10 mx, peak in. 300w.

FTDX-401 TRANSCEIVER: 80/10 mx, PA two x 6KD6, 560w. peak input SSB, choice of manual, PTT or VOX operation. Full coverage on 10 mx, offset tuning, calibrator. Includes fan, CW filter, noise blanker, **$675.**

FV-401 EXTERNAL VFO: For FTDX-401, **$115.**

FT-101 TRANSCEIVER: 160/10 mx, SSB, AM, CW. PA two x 6JS6A, 300w. peak input SSB. Built-in dual AC/DC power supply. Low current drain transistorised except for transmitter driver and PA. Plug-in modules, I.F. noise blanker, FET receiver RF, clarifier, built-in speaker. Ideal for portable/mobile from 12v. DC, or in the shack on AC, **$720.**

FV-101 EXTERNAL VFO: Matching auxiliary VFO for the FT-101, **$115.**

FT-200 TRANSCEIVER: 80/10 mx, PA two x 6JS6A, 300w. peak input SSB. Manual, PTT or VOX control, offset tuning, calibrator. Operates from a separate power supply, **$395.**

FP-200: Yaesu AC Power Supply for FT-200, in matching cabinet with in-built speaker, **$90.**

DC-200: Yaesu 12v. DC Power Supply for FT-200, complete with special plug and cable, **$135.**

FT-75 TRANSCEIVER: SSB and CW. VXO, noise blanker, squelch. Very small size, transistorised, a superb little rig (see review "A.R." Sept. '72). Microphone and four crystals included, **$289.**

FP-75 AC POWER SUPPLY: 230v., for FT-75. Built-in speaker, power cable and plug, **$49.90.**

DC-75 DC POWER SUPPLY: 12v., for FT-75. Includes built-in speaker, mobile mount, power cable and plug, **$49.90.**

FV-50C VFO: for FT-75, **$39.90.**

FLDX-400 TRANSMITTER: 80/10 mx, PA two x 6JS6A, 300w. peak input SSB. Manual, PTT or VOX control, SSB, AM, CW. Adaptable to FSK for RTTY. Mechanical filter, **$436.**

FRDX-400 RECEIVER: 160/10 mx. Mechanical filter, I.F. "T" notch rejection tuning, calibrator. Provision for installation of FET VHF converters, FM, and 600 Hz. mechanical filter for CW. Can be coupled with the FLDX-400 for transceiving, **$428.**

FL-2000B LINEAR AMPLIFIER: 80-10 mx. Tubes, two x 572B triodes in G.G., twin fan cooled. **$398.**

FL-2100 LINEAR AMPLIFIER: Similar to FL-2000B but styled to match FT-101, **$398.**

FL-2500 LINEAR AMPLIFIER: 160/10 mx, four x 6KD6 tubes, standard cabinet, **$315.**

FTV-650 SIX METRE TRANSVERTER: Converts 28 MHz. SSB to VHF, and includes receiving converter. Primarily designed for coupling with Yaesu models FL/FRDX-400, FTDX-401, FT-200, FT-101, with simple installation requirements, **$165.**

FT-2FB TWO METRE FM TRANSCEIVER: 10w., fully solid state, with mic. and power cable, **$259.**

FP-2AC AC POWER SUPPLY for FT-2FB, includes speaker and battery charger, **$69.**

FT-2AUTO FM TRANSCEIVER: Similar to FT-2FB but with addition of automatic scanning facility, etc., **$375.**

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DF-43B hand-held PTT **DYNAMIC MICROPHONE, $16.50.**

Sets pre-sales checked, after-sales service, spares availability, and warranty.

All Prices include Sales Tax. Freight is extra.

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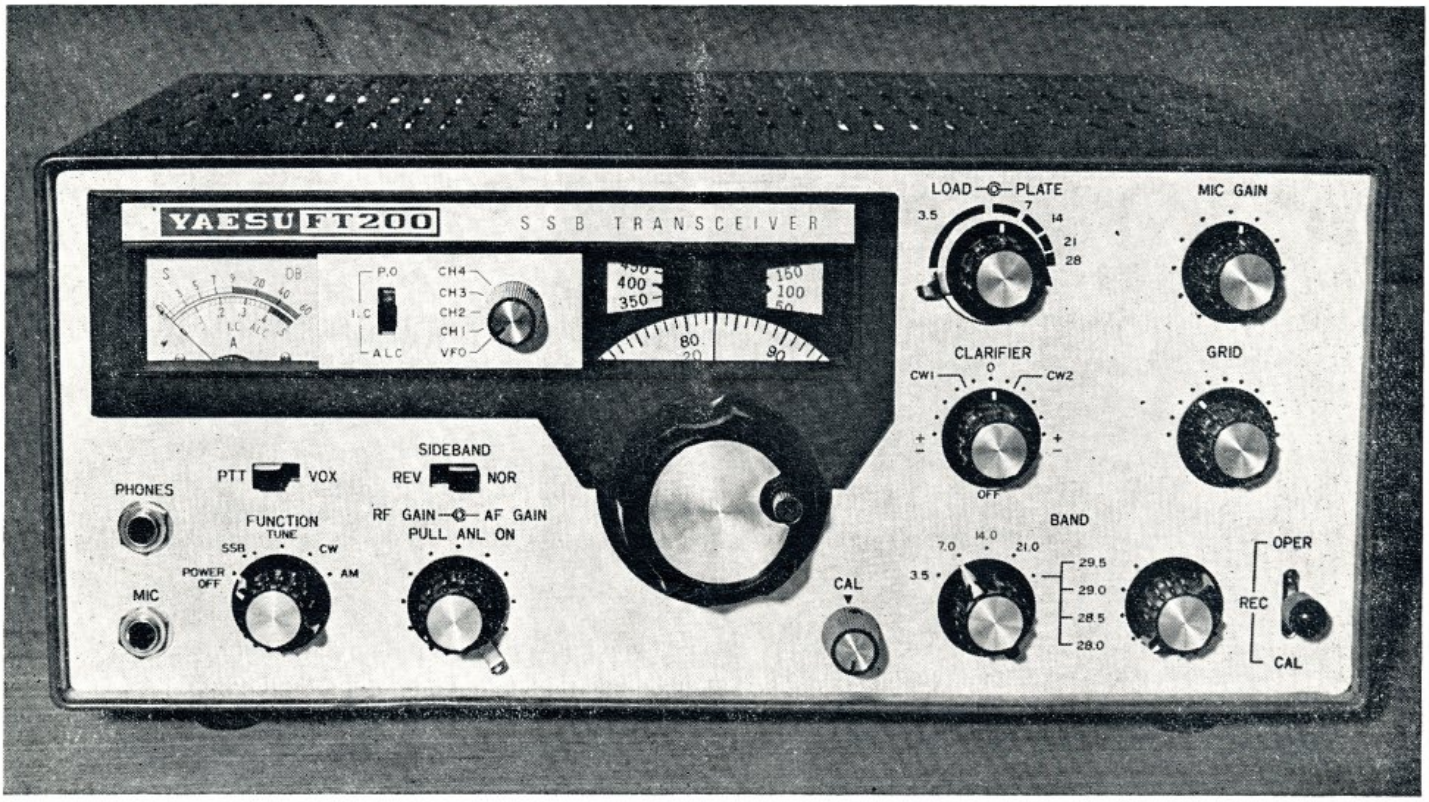

ECONOMICAL SSB! *from YAESU*

FT-200 FIVE-BAND TRANSCEIVER

A superb quality, low cost, versatile transceiver. Covers 80-10 mx, tuning range 500 Kc. each band. On 10 mx, crystal supplied for 28.5-29 Mc. (Crystals available optional extra for full 10 mx coverage.) SSB, CW, AM; with a speech peak input of 300w. Transistorised VFO, voltage regulator, and calibrator. 16 valves, 12 diodes, 6 transistors. PA two 6JS6A pentodes. ALC, AGC, ANL, PTT and VOX. Calibrated metering for PA cathode current, relative power output, and receiver S units. Offset tuning ±5 Kc. Uses a 9 Mc. crystal filter with bandwidth of 2.3 Kc. at —6 db. Selectable sidebands, carrier suppression better than —40 db. Sideband suppression better than —50 db.

Provision for use of optional external VFO, FV-200. VFO includes fixed channel facility.

Operates from conservatively rated separate 230 volt 50 c.p.s. AC power supply, FP-200, which includes built-in speaker. A 12 volt DC power supply, DC-200, is also available. Transceiver incorporates power take-off and low level R.F. drive outlets suitable for transverters.

Latest model includes (1) provision for use of external VFO FV-200, and (2) factory installed key-click filter.

Cabinet finished in communication grey lacquer. Panel, etched, satin finish aluminium.

FT-200 Transceiver	$395
FP-200 AC Power Supply	$90
DC-200 DC Power Supply	$135
FV-200 External VFO	$115
M-200 Mobile Mount	$14

Prices include S.T. Freight is extra. Prices and specs. subject to change.

All sets checked before despatch. After sales service, spares availability, warranty. All Yaesu sets sold by us are complete with plugs, power cables, English language instruction manuals, and three-core AC cable and 3-pin plug installed where applicable.

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NEWCOMER'S NOTEBOOK

With Rodney Champness,* VK3UG

LEARNING MORSE CODE

Part 1, Receiving

Many people have trouble learning Morse Code, and I freely admit I did too. I have heard some say that they cannot learn Morse Code, that it is useless and if a full Amateur licence were obtained they would not use Morse anyway.

To those who do claim that it is impossible for them to learn Morse to 10 w.p.m., all I can say is that if you brain-wash yourself in this anti-way, I cannot help you. If, though, you are prepared to assert yourself to the learning of Morse with an unbiased attitude, you will pass the Amateur Morse with little trouble. Like anything worthwhile, such as studying for the theory part of the exam., it takes time to become proficient. After all, the certificate we sit for is called a Certificate of Proficiency.

What is the value of Morse in this day and age where teleprinters and other exotic modes of communications are the in thing, and Morse is old hat, "obsolete"? The points I see for Morse Code are as follows:

(1) A sense of achievement; after all it is a thrill to pass after the 20th try at a Morse exam.

(2) It is the most effective DX mode that is easily used, and the most effective for the Oscar Satellite.

(3) The equipment is simple, but effective.

(4) The satisfaction of a quiet QSO without every vahoo eaves-dropping.

There is one reason why I didn't use Morse after obtaining my full call. **Fright**. Yes, that is right, being plain scared of it and of how any seasoned operator would treat me if I dared call. Don't worry, I've used QRS many times, the best operators don't mind at all. It's a long story, I do use Morse on occasions now—I am not the fastest or slowest, but I do try to make my sending of as high a quality as I can. I use an ordinary hand key as well as an electronic keyer.

The first part of this article has been to show you why I think Morse is worthwhile and to the limited extent the troubles I had learning to the standard required for a pass. Now the hard facts on how long you can expect to take to become proficient in the speed range 10 to 14 w.p.m. It pays to be a bit better than the exam. speed to allow for exam. jitters. If you are prepared to do half an hour of receiving practice at least four days per week, the A.O.C.P. should be within your grasp in about six months.

* 44 Rathmullen Road, Boronia, Vic., 3155.

How do you learn to receive Morse Code? You undoubtedly have heard Morse on your own or someone else's short wave receiver. Speech is a sound method of communication and so is Morse. Each is picked up and automatically analysed by your brain and transformed into intelligence — it is hoped. This means that Morse, like English, is a sound language and therefore should be learnt as such. For instance, the letter "V" is "d'd'd'dah" not "dot dot dot dah", the letter "P" is "d'dah dah dit" not "dot dash dash dot", and "E" is "dit". From this it will be observed that when a dot is at the end of a character it is pronounced as "dit", but wherever it is followed by some other element it is pronounced as "d' ".

You should learn each letter in a rhythmical singing way. Everyone around your household will think you've finally gone round the bend. Who cares, you want to learn the Morse so let them think what they like.

Having learnt each letter of the alphabet, the numerals and a few punctuation marks, etc., in all about 40 to 45 characters, you will be ready to start taking slow Morse. This may be from tape recordings, disc recordings, a friend's sending, or reception off the air. Before doing this, get some patient person to ask you letters, numerals, etc., at random. This will help you get away from the parrot fashion memorising of the alphabet. Having satisfied yourself on this point, now is the time to get down to serious practice to get your speed up.

It then becomes necessary to receive Morse Code at about 5 w.p.m. You should read this with difficulty. Where do you get this practice? The N.S.W. Division of the W.I.A. run Morse on VK2BWI nightly on a frequency of 3550 kHz. nominally from 7.30 p.m. local time with speeds from 5 to 18 w.p.m. This is good copy in the winter months at least for the Eastern States. Copy may be difficult in summer due to static, etc.

ZKY, the Royal New Zealand Air Force station, on frequencies of 3236 and particularly 6885 kHz., should be good copy at times. Eastern States Summer Time, the transmissions start 8 a.m. for 1¼ hours, and 5.15 p.m. for ¾ hour. Reports on this transmission would be appreciated by the Air Force. They transmit m.c.w. with a power of 300 watts.

Tapes are available from various Amateurs and I suggest you consult the Divisional Directory on page 3 of March 1972 "Amateur Radio" for further details.

I have been informed that the Youth Radio Club Scheme also have tapes available. I would suggest that you contact your State Supervisor for details. Their call signs are shown in the Directory mentioned above. For Morse records I would suggest a recently advertised course. A review of those available may appear in "A.R." soon I believe.

That's about all on the receiving side. Part 2, "Sending", will appear soon. In the meantime don't try sending; concentrate on receiving; **don't** buy one of those "beginner's" Morse keys. The ones I have seen are unsuitable for beginner and old-hand alike. More of this in the second part.

* * *

Following on the first article on converting old radios, how does the thought affect you of converting an old mains radio into a low power 160 metre or 80 metre transmitter, using very few parts other than those already in the set?

As mentioned last month, I have just shifted location and my workshop is not yet in being, so for the moment I must concentrate on the theory side of "Newcomer's Notebook". There are a number of simple accessories coming up for use in converted domestic radios, and this will be the follow up on the conversion of these sets, recently described.

FEDERAL W.I.A. NEW ADDRESS:

P.O. BOX 150,

TOORAK, VIC., 3142

Victorian Division address is unchanged as P.O. Box 36, East Melbourne, Vic., 3002.

"20 YEARS AGO"

With Ron Fisher, VK3OM

Two excellent technical articles were featured in the December 1952 issue of "Amateur Radio". A Phasing Type Single Sideband Suppressed Carrier Exciter by N. Southwell, VK2ZF, probably represented the ultimate in technical thinking of the time. In 1952 only a handful of Amateurs were using s.s.b. and probably most of the others thought it a passing fad; after all, how could you improve on a.m. The circuit basically consisted of a pair of 6SN7s as balanced modulators driving a 6BA6, with an 807 in the final. Full details of the design of the phase shift network were included.

Hans Albrecht, VK3AHH, described his simple v.f.o. with temperature compensation. A good deal of design data was included on the calculation of bandspread tuning and on the selection of the correct degree of temperature compensation. A very complete article containing information that could be hard come by even these days.

A front cover advertisement announced the arrival of the Innoval series of valves. Developed in Australia by Philips, the following types were included: 6V4, 6M5, 6AN7, 6N8, 6BD7, 6BH5 and 6AD8.

The Editorial page looked back over the preceding twelve months and opened with the following paragraph: "Over the past twelve months it is gratifying to note that in the realm of Amateur Radio events have taken place not only indicating the true Amateur zest and enthusiasm for his hobby, but also his willingness and ability to organise and function emergency communications in time of need." Quite a tribute.

Federal Executive Proceedings reported on the following: Request for Divisional status by VK9 Amateurs; emergency network plans for Civil Defence; disposition of unclaimed QSL cards; 1956 Olympic Games suggestions; Federal Policy Book; combining of Federal and Uniform Divisional Constitutions, and finally standard log sheet.

The best DX bands for the month were 7 and 14 MHz. The DX page edited that month by VK7RK for the first time, showed that 21 MHz. was still improving with Europeans peaking at 1000 to 1100z. The 10 metre band was still at a very low ebb, with the only report of activity coming from VK4XJ.

Y.R.C.S.

With Bob Guthberlet*

Following the request made by the Conference of State Supervisors, the appointment of Rex Black, VK2YA, as convener of a Standards and Syllabus Committee, is confirmed. The matter of a "Novice Licence" may influence certain trends in our syllabus. In the meantime, we can be confident that Rex and his committee will appraise the general situation to the end that in due time we may achieve standardisation.

After months of preparation, correspondence, etc., there appears to be a strange silence regarding the fate of "Novice Licensing". The introduction of such a licence would be a real shot in the arm for Y.R.C.S. It would give a boost to the electronics industry in Australia, as it has done in the United States. Perhaps some crystal gazing prophet will break the silence and make a forecast. Who knows?

Allen Dunn, S.A's Supervisor, has conveyed the news that Bert Grove of the Elizabeth Radio Club has accepted the position of Editor for "Zero Beat". Thanks, Bert.

Quest for Projects. Many of our clubs have instructional and interesting bits of equipment. It would be helpful to many instructors if we could pool such ideas. If clubs will send me copies of circuits and constructional details, I will undertake compiling a brochure for distribution to all States.

* Federal Y.R.C.S. Co-ordinator, Methodist Manse, Kadina, S.A., 5554.

NEW CALL SIGNS

AUGUST 1972

VK1ZBL—B. F. Lavery, 65 James St., Curtin, 2605.
VK1ZRB—R. F. Blyton, 21 Glasgow Pl., Hughes, 2605.
VK2ZW—A. J. Perkins, 4 May St., Sawtell, 2452.
VK2ADR—D. W. Reed, 22 Rundle St., Ulladulla, 2539.
VK2BDW—W. E. Dunn, 53 Mississippi Ave., Seven Hills, 2147.
VK2BOH—R. Baty, 66 Coorienbah Heights Rd., Engadine, 2233.
VK2BXX—C. M. Walker, 10 Trigalana Pl., Frenchs Forest, 2086.
VK2ZDY—D. R. De Cean, 25 Blacket Dr., Castle Hill, 2154.
VK2ZXB—F. R. O'Hare, 805 Henry Lawson Dr., Picnic Point, 2213.
VK3BY—J. W. Williamson, 30 Latona Ave., Knoxfield, 3180.
VK3JN—J. N. Blake, 7 Josephine St., Oak Park, 3046.
VK3MV—M. A. Hibbett, 15 Yanigin Dr., Glen Waverley, 3150.
VK3AXK—B. J. Kemp, 3 Cedar Crt., Glen Waverley, 3150.
VK3BGN—R. W. Rogers, Station: 31 Thompson Crt., Werribee, 3030; Postal: P.O. Box 30, Werribee, 3030.
VK3BGT—H. J. Brice, 94 Jasper Rd., Bentleigh, 3204.
VK3YGY—D. J. McManus, Barkers Creek, via Castlemaine, 3458.
VK3YHA—L. MacDonald, Geelong Rd., Bunyong, 3357.
VK3ZEE—K. G. Burlinson, 9a Park Cres., Fairfield, 3078.
VK3ZST—K. M. Stephens, 6 Cameron Ave., Mildura, 3500.
VK4OO—F. E. Griffith, 5/5 Laycock St., Surfers Paradise, 4217.
VK4ZD—R. Catton, No. 4 Lodge Flats, Cr. Burgess and Edmund Sts., Caloundra, 4551.
VK4ZAT—R. J. Kerle, 32 Evan St., Mackay, 4740.
VK4ZAV—R. F. Beak, 69 Koorong St., The Gap, 4061.
VK4ZFC—T. D. Gregory, Danga, Weipa, 4874.
VK6CH—C. A. Hermiston, Station: O.T.C., Carnarvon, 6701; Postal: P.O. Box 706, Carnarvon, 6701.
VK6HH—Hamilton Senior High School Amateur Radio Club, Purvis St., Hamilton Hill, 6163.
VK6HZ—R. L. Huisenga, 16 Ningaloo St., Exmouth, 6707.
VK6WF—R. Wawzynski, U.S. Navcomsta Holt, Exmouth, 6707.
VK8KS—K. C. Smith, Station: 2 Stasinowsky St., Alawa, Darwin, 5794; Postal: P.O. Box 2099, Darwin, 5794.
VK8PF—J. McWood, 25 Johannsten St., Alice Springs, 5750.
VK9LP—L. Pedrini, Station: Mobile; Postal: P.O. Box 88, Lae.

THE ROSS HULL VHF CONTEST IS NOW

CONTESTS

With Peter Brown,* VK4PJ

JOHN MOYLE MEMORIAL NATIONAL FIELD DAY

Some comments on the rules published here. You will note that I have not gone ahead with the proposal to use repeaters. I received comment from members who may have stood most to gain and as they were not keen on the idea it has been dropped.

V.h.f. operators please note the Section (e) which I trust will appeal to you. Please give it a good trial. The scoring rate has not been altered although **mobiles** may make more than one contact with the same mobile station with the usual 2-hour space. There should be some high scores in this section. **"Drive carefully".**

Apart from the **mobile** section, rules are as last year with the one important exception—c.w.-c.w. contacts count double. I am looking forward to some overseas interest and you might comment in your log.

Look out for the ZLs on 80 and 40 metres. It is their Field Day. I include some of Jock's (ZL2GX) comments: ". . . our National Field Day is primarily a means of simulated emergency practice . . . for example, the use of emergency power . . . to be under temporary shelter . . . use of only 80 and 40 . . . choice of time is designed to help cater for others who might be involved . . . such as wives, their co-operation is very desirable . . . and I know of many who go out and make the operation a picnic one." Whatever serial number you receive will be okay. If the ZLs can make it a picnic day, why not you???

Get some of your friends together and have a good day. Remember that certificates have been offered to the two overseas stations with the greatest number of Portable or Mobile Australian contacts. I wonder if we will get any mobile/mobile DX?

ROSS HULL MEMORIAL VHF-UHF CONTEST, 1972-73

I trust that the rules for the next contest were to your liking and that you have already checked your rig for the arduous time ahead. If it is not to be an arduous time, I am sure that those having such a time will be appreciating a call from you.

The contest may even be under way now. If we go to round figures in metric, what do you suggest? Move up or move down; what range?

CONTEST DATES

Ross Hull: On now. 1401 GMT 4th Dec., 1972, to 1400 hrs. GMT, 21st January, 1973.

John Moyle National Field Day: 0600 GMT, 10th Feb., 1973, to 0800 GMT, 11th Feb., 1973. The second week-end in February.

Remembrance Day 1973: August, get that c.w. operational, not much time.

* Federal Contest Manager, Box 638, G.P.O., Brisbane, Qld., 4001.

John Moyle Memorial National Field Day Contest, 1973

The Wireless Institute of Australia invites Amateurs and Short Wave Listeners to take part in this contest which is held in memory of a great supporter of the Institute, John Moyle. John passed away not long after returning to Australia after representing us at an International Conference.

This contest is either an individual effort or a group effort. There are two Divisions (parts) of this contest, one of 24 hours' continuous operation, and one of six hours' continuous operation, within the 26 hours available.

DATES AND TIMES

From 0600 GMT, February 10, 1973, to 0800 GMT, February 11, 1973.

OBJECTS

The operators of Portable or Mobile Stations within VK call areas will endeavour to contact other Portable or Mobile and Fixed Stations in VK, ZL and foreign call areas.

RULES

1. In each Division, 24-hour or 6-hour, the operating period must be continuous.
2. In each Division there are seven sections:
   (a) Portable, fixed field station, transmitting, phone.
   (b) Portable, fixed field station, transmitting, c.w.
   (c) Portable, fixed field station, transmitting, open.
   (d) Portable, fixed field station, transmitting, open, multiple operation.
   (e) Mobile, transmitting, phone.
   (f) Fixed transmitting stations.
   (g) Receiving of portable and mobile stations.
3. Contestants must operate within the terms of their licence.
4. A Portable, fixed field station must operate from a power supply which is not used to move a vehicle or which is not connected to a permanent installation.
5. A Mobile station must be installed in a vehicle.
6. No apparatus used by a field station may be set up on site earlier than 24 hours prior to the contest.
7. All Amateur bands may be used, but no cross-band operation is permitted.
8. Cross mode operation is permitted.
9. All operators of a multiple operator station must be located within a half-mile diameter circle.
10. For each transmitter of a multiple operator station a separate log shall be kept with serial numbers starting from 001 and increasing for each successive contact by one.
    All logs of a Multiple Operator Station shall be submitted by the operator under whose call sign the transmitters are working.
    No two transmitters of a Multiple Operator Station are permitted to operate on the same band at one time.
11. Amateurs may enter for any section.
12. An Amateur may enter for both Mobile and Portable sections but a separate log must be forwarded for each section which must be for one continuous period in each case, i.e. operators must not keep alternating between mobile and portable.
13. Entrants must call "Mobile" or "Portable" as the case may be, e.g. "VK3XY Mobile if a fixed field station.
14. Mobile stations and portable stations can contact each other as well as contacting fixed transmitting stations.
15. The usual method of giving RS or RST reports followed by serial numbers starting with 001 shall be adopted.
16. **Scoring.**

A: For Portable or Mobile Stations—

Portable or Mobile Stations outside entrant's call area	15 pts.
Portable or Mobile Stations within entrant's call area	10 pts.
Fixed Stations outside the entrant's call area	5 pts.
Fixed stations within the entrant's call area	2 pts.

B: For Fixed Stations—

Portable or Mobile Stations outside entrant's call area	15 pts.
Portable or Mobile Stations within the entrant's call area	10 pts.

17. Mobile operators may contact the same **mobile** station repeatedly provided that two full hours elapses after the previous contact.
18. Operation via active repeaters or translators is not allowed for scoring purposes.
19. All logs shall be set out under headings of Date/Time in GMT, Band, Emission, Call Sign, RST Sent, RST Received, Points Claimed. List contacts in numerical order.

A quarto front sheet to show the following information:
Name.....Division.....
Address.....Section.....
.....Call Sign.....
Call Signs of other operators.....
.....
Location.....Points.....
Operating times, from.....to.....

I hereby certify that I have operated in accordance with the rules and spirit of the contest:.....
Details of equipment.

20. Certificates will be awarded to the highest scorer of each section of the 6-hour and the 24-hour Divisions provided there is a minimum of three logs submitted in that section. The 6-hour certificate cannot be won by a 24-hour entrant.
21. Entries must be forwarded in time to be opened on 23rd March, 1973. Mark your envelope to indicate that it is a **John Moyle Memorial National Field Day** entry and address to **Federal Contest Manager, W.I.A., Box 638, G.P.O., Brisbane, Qld., 4001.**
22. All c.w./c.w. contacts count double. Refer sections (b), (c), (d).

Written comments will be received with interest. The decision of the Federal Contest Manager is final and no disputes will be entered into.

RECEIVING SECTION

This section is open to all Short Wave Listeners in VK call areas. The rules shall be the same as for the transmitting stations but may omit the serial numbers received.

Logs must show the call sign of the Portable or Mobile Station heard, the serial number sent by it and the call sign of the station being contacted.

Scoring will be on the same basis as for transmitting stations. It will not be sufficient to log a station calling CQ. For scoring purposes the left hand column of the log example must have only Portable or Mobile stations.

A certificate will be awarded to the highest scorer of each of the 6-hour and 24-hour Divisions, both individual and club entries.

EXAMPLE OF VICTORIAN SWL's LOG

Date/ Time GMT	Band	Call Sign Heard	RST Sent	Station Contacted	Pts. Claim
0600	80	VK2AA/P	58001	VK3ATL/P	15
0605	80	VK3ATL	49016	VK5QV	10
0640	20	VK3WW	59010	VK5QV/P	*
0650	2	VK4ZZA/M	59007	VK4ZAZ/M	10

* No score (fixed station).

AWARDS COLUMN

With Geoff Wilson,* VK3AMK

W.I.A. D.X.C.C.

FPHONE—

VK5MS	317/343	VK5AB	295/314
VK6RU	316/344	VK4UC	292/300
VK4KS	312/328	VK2APK	291/300
VK3AHO	308/326	VK4PX	285/288
VK6MK	304/327	VK4FJ	284/307
VK4VX	300/302	VK4TY	282/288

New Member:

Cert. No.	Call	Total
137	VK2GV	101/102

Amendments:

VK5WV	140/141	VK3ALM	203/204
VK1VP	151/152	VK4RF	237/238
VK3JF	192/193	VK3AMK	241/242

C.W.—

VK3AHQ	307/326	VK3NC	272/297
VK2QL	302/327	VK6RU	264/289
VK3YL	293/312	VK3YD	262/281
VK2APK	287/296	VK4TY	257/272
VK4FJ	287/315	VK4VX	254/255
VK3XB	284/300	VK3TL	252/260

New Member:

Cert. No.	Call	Total
100	VK2GR	104/105

Amendments:

VK3LV	125/126	VK4RF	213/226
VK4DO	195/213	VK4KX	216/217
VK3JF	198/206		

OPEN—

VK6RU	316/344	VK4TY	304/321
VK4KS	313/333	VK6MK	304/327
VK4SD	313/330	VK4UC	301/303
VK2VN	311/332	VK2EO	299/324
VK4VX	307/309	VK2SG	299/306
VK2APK	304/318	VK4FJ	295/323

New Member:

Cert. No.	Call	Total
147	VK8KP	103/104

Amendments:

VK3LV	130/131	VK4RF	269/282
VK3JF	230/238	VK4PX	293/300
VK4DO	243/256		

Deleted Country: 1M—Minerva Reefs. Only contacts prior to 15/7/72 will count as a separate country. All contacts after this date will count as for Tonga.

Country withdrawn from D.X.C.C. Listing: FO8M—Maria Theresa Reefs. All credit for this country has been withdrawn.

W.I.A. V.H.F.C.C. AWARD

New Members:

Cert. No.	Call	Confirmations 52 MHz.	144 MHz.
85	VK4ZAM	105	—
86	VK3BFG	—	100

Amendments:

29	VK1VP	249	—
61	VK1VP	—	113
80	VK4ZIM	717	—

W.I.A. 52 MHz. W.A.S. AWARD

Amendment:

Cert. No.	Call	Additional Countries
57	VK1VP	3

"CQ" AWARDS

Applications for awards issued by "CQ" Magazine are now being checked for Australian applicants by the Redcliffe Radio Club. All applications and inquiries should be addressed to:

Redcliffe Radio Club,
P.O. Box 20,
Woody Point, Qld., 4019.

W.I.A. AUSTRALIAN D.X.C.C. COUNTRIES LIST

The annual listing normally issued with the January issue of "A.R." will not be included next year. Instead, the Countries List will be contained in the new Call Book and it is hoped some additional awards information will also be presented if sufficient space is available. Alterations to the list of countries will be notified through this column as they occur.

* 7 Norman Avenue, Frankston, Vic., 3199.

Letters to the Editor

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

AMATEUR RADIO AND RADIO ASTRONOMY

To All VK Amateurs,

Recently, the National Australian Federation of Amateur Astronomical Societies (N.A.F.A.A.S.) was formed, with the object of federating and unifying the actions of the 90-odd amateur astronomical societies in Australia. One problem facing N.A.F.A.A.S. is that of quick communication. As a prospective amateur myself, Amateur Radio was considered. This letter is an attempt to get in contact with those amateur operators with an interest in astronomy, and associated sciences.

Here is a chance for you to increase your knowledge in astronomy and radio astronomy, by assisting in the operation of Astranet, the Australian Astronomical Radio Network. As well as this, you will be helping and increasing the status and knowledge of amateur astronomers in Australia and helping a good cause. If you can help, please contact me at the address given below.

Yours faithfully,

S. Russell, Secretary, I.A.S.Y.S.
92 Garden Avenue,
Figtree, N.S.W., 2500.
Phone (042) 28-6270.

"WILL AMATEUR RADIO BE KILLED BY SINGLE SIDEBAND?"

Editor "A.R.," Dear Sir,

Single sideband has more talk power than ancient modulation and will punch through where the other cannot. It does not set up heterodynes with other stations because the carrier is missing. It occupies less bandwidth because one sideband is missing.

This we all know and appreciate. But have we considered the cost? Not only the beautiful dollars for the transceiver and the beam, but also the cost in other directions. Consider the young short wave listener. He was (past tense) a lad whose sole equipment was the domestic radio with shortwave facility. This enabled him to listen to VK2AAA talking to VK3BBB. His interest was immediately kindled and he lost no time in making enquiries, and in many cases eventually became an Amateur himself.

His modern counterpart has his own transistor radio but when he switches to shortwave what does he hear on the Amateur bands but a lot of indecipherable duck talk? His interest is lost in about ten seconds, during which he decides the fault is not in his radio; there must be something wrong with that transmission, whatever it may be. The spark, never having been kindled in the first place, cannot become a flame and the lad's interest moves off in some other direction.

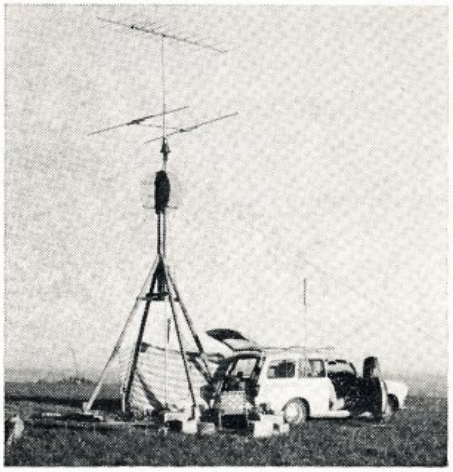
If the places left by "Silent Keys" are not filled by young lads (and lasses) then sometime in the not very distant future the ranks of Amateur Radio are going to be considerably thinned. The question arises, "Will Amateur Radio be killed by single sideband?"

Our hobby is worth nurturing; it has something of interest to give to the community. We have derived a lot of pleasure from it so let us share it with the up and coming. How? By blowing the dust off that old a.m. gear and using it occasionally, especially on short-haul contacts, where it works quite well and, secondly, by developing and using low power transistorised a.m. equipment which can be built by the relatively unskilled (incidentally, how many people build their own s.s.b. equipment?) at a cost of a few dollars and which is powered at sub-lethal voltages, for example, from a 12-volt car battery.

—G. Craggs, VK2AYG.

Writing about the VK5 Intrastate Contest held on 1st October, Rod Cunningham, VK5UV, said that good v.h.f. contacts were had from the mobile QTH on Bumbunga Hill (1,355 ft. a.s.l.) about 75 miles N.E. of Adelaide, both back into Adelaide and to country stations VK5UJ at Whyalla, VK5ZMJ at Port Pirie and the three Ians (VKs 5IZ, 5ZIN and 5VJ) on Yorke Peninsula.

He and Peter VK5ZPS nearly froze overnight and made 58 contacts with the comment that activity this year seemed lower because of good weather and the car race.



Picture of station set up on the trig point on Bumbunga Hill by VK5UV and VK5ZPS.

OBITUARY

HUGH STITT, VK2WH

The late Hugh Stitt, VK2WH, widely known as Hugo, was the descendant of an old Scottish family which settled on the Lauchlin, near Forbes, about a century ago. Hugo was educated at the Kings School, Parramatta, and developed great keenness on wireless, being the first to receive t.v. over the mountains.

A man of charming personality with a wide circle of friends including golfers of the Forster-Tuncurry Golf Club where he had been chairman.

Deepest sympathy is extended to his wife Jean and to members of the family —John, David, Helen, Robert and Angus.

BUILDING MODERN FILTERS

(Continued from Page 9)

Band-Pass Section

Refer to Table 1B for the tabulated calculations for this type of filter.

NORMALISED LOW-PASS FILTER-ELEMENTS

Column headings in Table 2 are to be read with respect to labelled elements in the reference circuit shown, which is seen to have a T-type input.

(For current-sources, or transistor-circuits, it may be desirable to use a π-type input. The appropriate set of column headings would then be, starting from the first shunt capacitor, C1, L1, C2, L2, C3, reading across the second line, N = 5, for a 5th order π-input filter. Similar remarks apply to Table 3. Sufficient will be gained if we master the T-type circuits first.)

Example 2:

An RF Low-Pass Filter

For brevity, let us assume we have a 50-ohm mixer producing a 2 MHz. output signal from a local oscillator and input such that the bandwidth is 200 kHz. The filter is to attenuate input, local oscillator and sum frequencies by not less than 30 dB., but pass the upper limit of the difference-frequency bandwidth with not more than 1 dB. of loss, and be matched for power.

Solution: Upper limit of the difference-frequency band is 2.1 MHz. For 30 dB./octave, we require N = 5 sections. We need to check that the 3 dB. down point for N = 5 will be somewhat above 2.1 MHz., since we are only allowed to be —1 dB. at 2.1 MHz. A curve of attenuation v. frequency for an N = 5 flat filter would show that the response is just 1 dB. down when the frequency is 0.8 of the 3 dB. frequency. Thus our cut-off frequency has to be read as 2.62 MHz.

Entering Table 2 for N = 5, and following precisely the same pattern as for the LP filter of the previous example, we should obtain:

$$L1 = L3 = \frac{0.0983 \times 50}{2.6 \times 10^6}$$

$$= 1.88\ \mu H.$$

$$L2 = \frac{0.318 \times 50}{2.6 \times 10^6}$$

$$= 6.06\ \mu H.$$

$$C1 = C2 = \frac{0.258}{50 \times 2.6 \times 10^6}$$

$$= 0.00197\ \mu F.$$

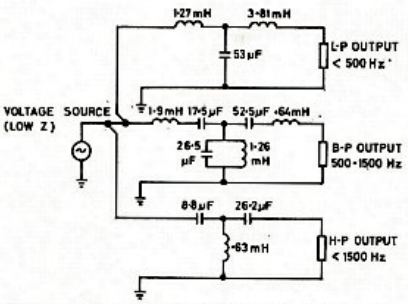


FIG 2 CROSS OVER NETWORK. LOAD IMPEDANCE 8 OHMS

CONCLUSION ON BUTTERWORTHS

The capacitor values are a little difficult at very low audio frequencies, but as the 3.5 kHz. filter showed are quite easy by the time the frequency requirement rises to a few kHz., and become no problem at all at radio frequencies.

Finally, for higher attenuation the number of sections can be a constructional problem. This, of course, is where the equal-ripple and elliptic filters show their power. ●

(to be concluded)

KEY SECTION

With Deane Blackman,* VK3TX

The Ross Hull (VHF) Contest starts this month and there is a c.w. only section which should get some support from readers of this column if it is to remain as part of the contest. The rules appeared in October "A.R."—good luck!

Since the last list we have the following new members: 39, VK7RD; 40, VK3LV; 41, VK2AXK and a few more in the pipeline.

We are presently working on schemes to involve s.w.l's and DX working c.w.; the idea will be to encourage c.w. contacts with VK (particularly K/S members). Details will be published as soon as agreement between Divisional Co-ordinators has been obtained.

Notwithstanding what you hear on the air, there is a prescribed relation between the length of dots, dashes and the spaces between them in International Morse Code. I happen to find particularly annoying the fellow using an elbug set at 35 w.p.m. but in fact getting his traffic out at 15. There are other perversions. Proper Morse sending normal English at any speed has a duty cycle of 47 per cent., by the way, if you want to extract a bit more from your final.

Warmest Christmas Greetings from the Key Section, and f.b. operating in 1973.

* P.O. Box 382, Clayton, Vic., 3168.

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160 MX TRANS-PACIFIC TESTS

Dates: December 23, January 13, and February 10.

Times: 1330-1600 GMT.

Frequencies: VK 1800-1805; ZL 1875; W/VE 1800-1807; JA 1907.5-1912.5; others 1800-1805.

Procedure: Call "CQ DX TEST" for the **second** 2½ minutes of each 5-minute period. W/VE stations will be calling CQ DX during the first 2½ minutes of each 5-minute period. Keep to the 5-minute periods **accurately**, unless in QSO.

The Trans-Pacific Tests are not a DX contest. They are "activity nights", organised for the whole of the Pacific area. They enable many stations to be active on the same night, enabling DX contacts that may otherwise not be made. Contest logs are not required, but reports of interesting or unusual contacts would be appreciated by your DX Editor and/or W1BB for publication in his "160 Metre DX Bulletin". —Peter VK3APN.

FEDERAL W.I.A. NEW ADDRESS:
P.O. BOX 150,
TOORAK, VIC., 3142

Victorian Division address is unchanged as P.O. Box 36, East Melbourne, Vic., 3002.

VHF UHF

an expanding world

With Eric Jamieson,* VK5LP

Closing date for copy: 30th of month.
Times: E.A.S.T.

AMATEUR BAND BEACONS

VK0	53.100	VK0MA, Mawson.
	53.200	VK0GR, Casey.
VK2	52.450	VK2WI, Dural.
VK3	144.700	VK3WI/R6, Vermont.
	144.925	VK3QZ, Traralgon.
VK4	52.400	VK4WI/2, Townsville.
	144.390	VK4WI/R1, Toowoomba.
VK5	53.000	VK5VF, Mt. Lofty.
	144.800	VK5VF, Mt. Lofty.
VK6	52.006	VK6VF, Bickley.
	52.900	VK6TS, Carnarvon.
	52.950	VK6VE, Mt. Barker.
	144.500	VK6VE, Albany.
	145.000	VK6VF, Bickley.
VK7	144.900	VK7VF, Devonport.
VK8	52.200	VK8VF, Darwin.
ZL1	145.100	ZL1VHF, Auckland.
ZL2	145.200	ZL2VHF, Wellington.
	145.250	ZL2VHP, Palmerston North.
	431.850	ZL2VHP, Palmerston North.
ZL3	145.300	ZL3VHF, Christchurch.
ZL4	145.400	ZL4VHF, Dunedin.
JA	52.500	JA1IGY, Japan.
HL	50.100	HL9WI, South Korea.
	52.010	HL9WI, South Korea.†
ZK	50,100	ZK1AA, Cook Island.†
3D3	50.100	3D3AA, Fiji Island.†
5W1	50.100	5W1AR, West Samoa.†
CE0	50.100	CE0TS, Easter Island.†
KX6	50.110	KX6HK, Marshall Islands.†

† Denotes new listing.

Additional beacons which may be worth considering if conditions are right include WB6KAP on 50.013; K5AGI 50.015; VE8YT 50.098; VE2BYG 50.065; KH6EQI 50.104; JA4, 6, 8, 9IGY 50.500.

TELEVISION STATIONS

The sound carriers from various television stations are useful as beacons quite a lot of the time, DX season and otherwise.

50.750	Channel 1 from New Zealand.
51.740	Channel 0 from Wagga.
51.750	Channel 0 from Brisbane.
51.760	Channel 0 from Melbourne.
143.750	Channel 5A from Wollongong.

Note that there is a 10 kHz. separation between the various Channel 0 stations, and by this means it is possible to identify the location of the station. As the power of these stations is 100 kw. e.r.p. it follows that they need generally to be very strong before Amateur signals can be heard. Channel 5A should be watched carefully for the next few years during DX periods as it seems likely 2 metre long distance contacts should be available for paths of 1,000 miles and more as accomplished during the 1962-64 era.

I am indebted to the VK6 V.h.f. Group News Bulletin which provided the additional beacon information this month. Readers should note that this list is the longest yet published in "A.R." so far, and is intended as a reminder as to what could be available during the peak of the DX season during December and January. The long listing therefore will not appear again until next December, but it is anticipated ordinary listings will continue, plus alterations and any new beacons.

SIX METRES IN BARBADOS

I was pleased to receive a letter from Alan Isaachsen, 8P6EN, ex-VK5IR, VK5ZEI, and here are some extracts. "The 6 metre season during May, June and July was the best I have experienced, with 350 contacts into the U.S.—a minimum of 1,700 miles. Of these, 250 would have been over 2,200 miles and five over 4,000 miles. Most contacts were double hop Es (some triple hop?) with one or two F2 openings. I am the only 6 metre station in Barbados and as far as I can make out the second ever and he never made it to the U.S. I use my 6/40 home-brew transverter and the antenna a 4 element quad.

"I read with interest the article in 'A.R.' by VK2ZTB on TEP. This puts Barbados right on the line for both Class I. and II. TEP. I have had Class II. TEP to Argentina so far (only mid-September equinox period as VK-2ZTB predicts), but until I read the article had little hope of using TEP here. So far I have worked six countries on 6 mx.

"Another item of interest is that Cable and Wireless operate commercial tropo stations here on 200 MHz. over 200 miles. Inversions over 1,000 mile paths here are common. I have just finished a 6/40 2 mx transverter and a 2 metre quad, so I'm setting up skeds pretty soon with the Florida boys . . . Would you believe a Channel B 146 MHz. f.m. net is operating on the island? Five stations operating."

Thanks for the letter, Alan, and hope to hear from you further. Mouths will be drooling at your prospects on 6 and 2 mx over there. Glad to know the v.h.f. notes keep you in touch with VK activity.

AUSTRALIS OSCAR 6

This column acknowledges the great achievement by the Amateurs responsible in establishing Oscar 6 in such a functional way that all who are prepared to go to a little trouble can either listen to others or make use of the facilities themselves.

Oscar 6 has provided a means for contacts to be made between ZL and VK stations, and VK to VK right across Australia. As the first flush of excitement dies down it will be possible to have better contacts than at present as power sharing becomes less, and possibly contacts from areas away from our own may be completed. My 600 foot long wire being used to receive on the 29.450 MHz. downlink is giving excellent results, with probably VK6HK at S9 being one of the more consistent good signals. It is not proposed to go further into Oscar 6 matters at present in this column as I believe relevant details will be the subject of a separate article in this issue. Anyway, a fine effort.

TWO METRE INVERSION

The 16th October saw the start of an inversion across southern Australia, which resulted in some long distance contacts. Bob VK6BE observed the VK5VF beacon about S9 at nightfall, and he and Wally VK6WG spent a long time trying to arouse activity on the band, finally coming across George VK5GG on 40 metres! George had a faulty converter, but his 2 metre s.s.b. was plainly audible in Albany. Tony VK5ZAI at Bordertown, about 180 miles S.E. of Adelaide, worked VK6XY and VK6KJ 5 x 9 on Channel B f.m. The Channel 4 repeater provided contacts into Adelaide for VK-6XY, BE and WG. Bob VK5DDX spent more than 1½ hours nattering to Wally VK6WG on 2 mx tuneable from midnight, with signals peaking over S9. The conditions were still very good on the next night, Tuesday, VK-7ZGT mobile was noise free through Adelaide repeater, and it took until Wednesday night for conditions gradually to resume normality.

An unusual feature of the above 144 MHz. propagation conditions was the effect upon television reception in the Adelaide Hills. There are several locations in the hills which are classed as fringe areas due to topography, although only 15 miles from the t.v. transmitters. On the peak Monday night, many residents of these areas lost Channels 7, 9 and 10 entirely through a blanket of snow, something which had never occurred before. Tuesday night was almost as bad, and still some snow Wednesday night. Checking the situation during the week, it appears almost everyone without line-of-sight conditions to the t.v. stations were affected in some way or other. My telephone ran hot answering viewers questions!!

FROM THE MAIL BAG

Roger VK9RI (ex-VK2ZTB) now on Cocos Island, advises he is constructing beacons for 6 and 2 metres having voice ident. He says he will be in attendance all the time—the place is so small he can hardly do anything else! Frequencies, etc., later. He tunes 6 metres every day using an Eddystone 990R covering 27 to 250 MHz. Few weak signals, but no contacts yet. Runs skeds with VK6CH in Carnarvon on 6 and 2, but no results. Will be operating through Oscar 6 soon. Eastern States of VK are 3,700 miles away. This year's Es season might have lots of things to interest you, and us, Roger.

Mike VK2AM mentions Barry VK2ZAY as being the heart-throb of Rod VK2ZQJ, Roger VK2ZRH and Keith VK2BKL. Situated at Boggabri, 280 miles north-north-west of Sydney, and all stations use s.s.b. Frequency generally 144.010, 2100 hours Sundays, Mondays and Wednesdays. Not that far away at Tamworth are VK2s ZCV, ZOY and ASI. Barry VK2ZAY frequently hears VK5VF on 144.800, so perhaps the big guns of VK5 might consider some skeds soon.

Mike also reports Roger VK2ZRH has four 10/10 for 144 MHz. and 64 element collinear on 432 MHz., and is currently looking for m.s. skeds on 144. Rod VK2ZQJ is also available for such skeds.

The first issue of "Tuned Lines", the new bulletin of the VK2 V.h.f. and T.v. Group has arrived and this month features Amateur Television. Also included is an article on adapting household radios to work on 1.8 MHz. (in a v.h.f. publication!). Anyway, I wish the editorial committee well, and hope to continue to receive copies.

NEWS FLASH

Michael VK4ZMI, of Kingaroy, 100 miles north of Brisbane, took the trouble to telephone me while these notes were being prepared, to advise of the first substantial 6 mx DX opening to Japan for this season occuring on Saturday, 28th October, from 1530 to 1730, signals peaking to 5 x 9 both ways. Malcolm VK4ZEL in Brisbane also worked quite a number and he runs only 1 watt of s.s.b! Districts represented were JH1, JA3, 3, 5 and 9. The band re-opened briefly during Saturday night, 2000 to 2200. The shortage of VK4 stations during Channel 0 hours might gradually be overcome with 4 or 5 more operating s.s.b. this year, Michael reports, so this is good news for the other States.

BEACONS AGAIN!

Briefly, the VK2WI beacon is to operate with c.w. and not m.c.w. VK0VS seems unlikely to be in operation at present. The VK1 beacon awaits the P.M.G. licence.

That looks like most of the news for this month. December should see the peak of the DX season reached, and again keep an eye on 2 metres, remember, when the skip distance shortens the MUF rises, so if you can hear and work stations 300 to 400 miles on 6, a few calls on 2 metres would be advisable. Also remember this year there will again be a lot more stations on s.s.b., many only with transceive facilities, so net on to their operating frequency. Of course there may be a dog-pile if he is a popular station, but this sort of thing goes on all the time on 20 metres for the rare one's, everyone will eventually get an answer!

Christmas is coming, may I extend Seasons Greetings to everyone and hope to hear you on 6 and/or 2 mx this year. Special thanks to all my contributors and an extra greeting to them. I would like to include Bill Roper, the Editor, for his support and interest during the time he has been in office, and few outside the circle of "Amateur Radio" know the efforts and sacrifices he makes to ensure that our national magazine is something to look forward to each month. A job well done, Bill. Closing with the thought for the month: "The electronic computer saves man a lot of guesswork—but so does a bikini!" The Voice in the Hills.

BEACON CALL SIGNS

Correspondence with the Controller, Regulatory and Licensing, of the P.M.G's Dept. (Ref. RB4/4/23) has clarified the standard call signs to be issued for beacons.

It was hoped to obtain single letter call signs but this series has already been allotted to Experimental Stations.

The following call sign blocks have been reserved for Amateur beacon stations:—

State	Initial Issue	Back-up
A.C.T.	VK1RTA—RTF	VK1RSA—RSF
N.S.W.	VK2RTA—RTF	VK2RSA—RSF
Vic.	VK3RTG—RTK	VK3RSG—RSK
Qld.	VK4RTL—RTO	VK4RSL—RSO
S.A.	VK5RTP—RTS	VK5RSP—RSS
W.A.	VK6RTT—RTW	VK6RST—RSW
Tas.	VK7RTX—RTZ	VK7RSX—RSZ
N.T.	VK8RTP—RTS	VK8RSP—RSS
T.P.N.G.	VK9RTG—RTK	
VK9 other	VK9RSG—RSK	
Antarctica	VK0RSG—RSK	

The Department requests that representations should now be made to the State offices to change the identification call signs of existing stations if this is desired, but, it is stated in this respect, quote, "In situations where there is reluctance to change the call sign at present allotted to an Amateur beacon station, the licensee should be given a reasonable time in which to make the alteration with a maximum period of five years."

WANTED—LOGS FOR THE
ROSS HULL VHF CONTEST

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* Forreston, S.A., 5233.

you and DX

With Don Grantley*

Times: GMT

Reports coming to hand indicate that there have been some good openings on the major DX bands over recent weeks, unfortunately I am still unable to check the doings personally as my gear is in VK4. I do understand that the segment commonly known as the citizens band has been coming in extremely well from across the Pacific, and if this is any indication, then we could well have some good 10 metre activity. It would not be out of order if I suggested that some positive action by the Authorities in respect to the 27 MHz. band would prove quite rewarding. This band and many of its unauthorised occupants need a clean-up. They persist in imitating those undesirable types who play havoc with the U.S. Citizen Band in that country, and I believe that there is no place here for them in any part of the spectrum.

I must thank the Illawarra Branch for their regular newsletter, mailed on by Hank VK2BHL. Hank has gone to a lot of trouble to prepare the DX news in this newsletter and it is greatly appreciated, much of it being scattered through this page.

Recent operation by SV0WJJ, SV0II and SV1DB using the call SY1MA is of interest. The operation was from a Monastry of an independent religious order on Mt. Athos, and according to info relayed through I1IIZ by K3RLY, it will have separate country status. The operation was scheduled to be on s.s.b. only, and the manager is WA1HAA, Wm. B. de Lage, 238 Slater St., Attleboro, Mass., 02703, U.S.A. A late news-sheet from Geoff Watts describes Mt. Athos as an Autonomous Dept. of Greece since 1927, and consists of about 20 monasteries on the Acte peninsula. The operation was from a temporary shelter 5,000 ft. up the mountainside, and heavy rain made the job difficult. It is understood that there will be a further operation at a later time by about 10 SV1 operators using c.w./s.s.b. on all bands. There is some discussion about this operation. The SV1 chaps say that the operation was illegal and the SY1MA call was not issued, however Vince, the main operator, says that he has the necessary documentation.

W3HNK and KV4EY are at present operating as FG0AFC/FS7, period of operation from October 17 to 31, also on from that location during the last week-end in October was FG0AMC/FS with F5ZW doing the job. QSLs for the latter to go to F2QQ whose new address is R. Gemehl, Domaine du Petit Beauregard, Bat 9, APT 14, F-78 La Celle Saint Cloud, France.

Minami Toroshima is again in the news with KA1DX operating from the former Marcus Is. over the last week-end of October until Nov. 1. All QSLs to WA6AHF please.

Some of the DX listed for the contest week-end at the end of October: ZD3X (QSL OH-2MM), XV5AC (to W1YRC), XD1AK (to XE1AK), XI1IX (to XE1IX), W4GIW/VP7 who will move to VP2VAV from Nov. 13 to 15, then to VP2E on Nov. 16 and 17. PJ1AA (Box 383, Curacao), KS4KZ from Serrana Bank (to WA3TDY), IG9BAF from Lampedusa Is. in the Pelagic group (to I1BAF), DK6NC and DK8FZ from HB0 (to home calls), and HT0A (to YN1DS).

There are still many new prefixes to be found around the dial, the 5N2 chaps are using 5N5 during October, several of the XE gang will be using 6D and 6J prefixes over the contest period, PY stations were using PW during September, VA8NC was a special operation by VE6LQ and other North Alberta ARC chaps. 9H5 is being used by British military personnel on Malta. One who is fairly active is Geoff 9H5D, he being ex G3POX, DL2OX and VK8OX. His manager is G3PRS. YO0XPO from Oct. 15 to 25 was in session from the International Fair in Bucharest.

No doubt about it. We sure do get some queer situations in Amateur Radio. Take for instance the Phoenix Islands. Bert VR1PA is also licensed as WB4LGK/KB6, and subject to the base commander he can, by using reciprocal licensing facilities, sign KB6 and VR1 from the same room and count as two countries for D.X.C.C. QSLs go to Box F-82, APO San Francisco, California, 96401.

* P.O. Box 222, Penrith, N.S.W., 2750.

7Z3AB, well known to operators in this area as MC of the Arabian Knights Net, will be visiting this country in the latter part of January. He expects to be here for the last two weeks, visiting Perth, Albury, Adelaide and Sydney.

C31 continues to be on the air with C31FQ being quite active in the 28 MHz. band; his manager is DJ5PN. C31CH, whose QSLs go to F8YY, and C31FG (ON6RO) assisted by C31FD are keeping the country on the map. The latter's manager, DL2BK, has a new address, Gerold Stueherenberg, Widdelswehrsterstr 3, 297 Emden-Hilmarsum, Germany.

WA8QOX/VE8, who has been operating on 14270 s.s.b. quite regularly around 0900z, is located on Baffin Isl.; QSLs should be sent to manager WA1PEL.

Those chaps who are using, or contemplating using, Scotts QSL service are now in for a rude shock according to a report in Geoff Watts DX News sheet. Scott is now a member of the U.S. Navy and his QSL service has been forced to close down.

Future operation from XU1AA will be from Phnom Penh University, mainly by Vong Sarin, XU1VS. QSLs for past operations by Tony Kathro may go to his home address, 10 Erw Wen, Rhiwbina, Cardiff, Wales.

From Bhutan we have news that A51PN is quite active on c.w., usually on 14075 at about 1200-1500, address is Pradham, C/o. Post Office, Thimphu, Bhutan. A51TY who has been on the air up till recently is now back in India, but should return to Bhutan by the latter part of Oct. JA3DJ, Masaya Nakajima, 652-101 Takamiya, Neyagawa, Osaka, Japan, and a group consisting of JA3WT and JA3GZN should be operating from Bhutan from Nov. 7 to 13 on all bands including 160 metres.

Some VP8 stations have been heard of late. VP8ME from the South Orkneys is QRV 14/21 MHz. 1830-2200z daily, and from 1100 on the week-ends. He has also been reported on 7220 at 0700 and 3800 at 1000z. VP8MS on Argentine Is. is using 14127 and 21250, manager is C/o. Box 137, Port Stanley, Falkland Is. VP8MX is on South Georgia, ZS1ACD is his manager, he also uses the same frequencies as 8MS.

A MERRY CHRISTMAS AND
A HAPPY NEW YEAR TO ALL

A change in address for 9H4 cards has been announced, the new manager is 9H4G, Eric Rogers, Dar Ghall-Kwiet, Ghajn Melel St., Zebbug, Gozo, Malta. Only 9H4 cards should go to Eric please.

ZK1MA from Manihiki, ZK2BD from Niue, and ZL3KK/C are causing some interest in the Pacific Area. ZK2BD wants his cards sent to Box 37, Niue, whilst ZL3KK/C's go to ZM4CR.

Islands of the Air Winners for 1971 have just been announced. World Champion and winner of the Silver Cup was IT9JT, Frank Paone, with 168 islands in all continents, other winners UK G3RWQ, Europe IT9JT, North America W2TP, Africa 5H3LV and Asia JA8ZO.

Silent Keys.—Roy Alciatore, W5RU, well known as the proprietor of Antoine's Restaurant in New Orleans, passed away on 29th Sept. W. Dalmijn, PA0DD, treasurer of I.A.R.U. Region I., passed away on 18th Sept.

I am writing these notes at Penrith on 27th Oct. at 4 a.m., they will appear in the Dec. issue which means that these few items will wind up what has been a very poor year radio-wise, as far as I am concerned. Many thanks to those of you who have supported my efforts over the year, also to the several overseas clubs which have supplied information regularly. My best wishes to all.

Mellish Reef.—The following will appear in the December 1972 issue of "QST":—

"The October 1972 issue of 'QST' carried a DXCC Note announcing the addition to the A.R.R.L. Countries List of Mellish Reef. Acceptance date for DXCC submissions for Mellish Reef was announced as November 1, 1972. Most unfortunately, serious questions have been raised concerning the operations that have taken place from Mellish Reef and until such time as the validity of the points in question have been ascertained, no DXCC credits for Mellish Reef have been, or will be, made. Therefore, please do not submit any Mellish Reef confirmations for DXCC credits until an announcement does appear in 'QST'.

"Because of the delay in granting DXCC credits for Mellish Reef, the bottom number for the December submissions for DXCC Honor Roll will be 311 deleted and submissions for that total will be accepted."

Ionospheric Predictions

With Bruce Bathols,* VK3ASE **DEC. '72**

Listed below are the Ionospheric Predictions for December 1972 from the charts supplied by the Ionospheric Prediction Service Division.

Allowing for the predicted M.U.F. and A.L.F., these listings should provide radio communications between the stated times for most days of the month.

All times are G.M.T. VK0 is Macquarie Island, VK4 is Brisbane, and ZL is Auckland.

28 MHz.—

VK1/2	to	VS6		0200-0500
VK3	,,	JA		0400-0600
VK4	,,	5Z	L.P.	2400-0100
,,	,,	W6		0100
VK6	,,	G	S.P.	0800
,,	,,	W2		2200

21 MHz.—

VK1/2	to	8P	S.P.	2000-0500, 1100-1400
,,	,,	8P	L.P.	1000-1600, 2100
,,	,,	VE3	S.P.	1500, 1800-2400
,,	,,	W6		1900-0200
,,	,,	ZS		0600-1200
,,	,,	PY		2300-0600, 0900-1100
,,	,,	VS6		1900-1100
,,	,,	SU		0400-1600
VK3	,,	G	S.P.	0700-1500
,,	,,	G	L.P.	1000-1200
,,	,,	UA		0500-1300
,,	,,	JA		2200-1200
,,	,,	W2		1400, 2000-2400
VK4	,,	5Z	S.P.	0700-1100
,,	,,	5Z	L.P.	0800-1600, 1900-0300
,,	,,	W6		1900-0200
,,	,,	PY		0900-1200, 2100-0500
,,	,,	G	S.P.	0800-1500
,,	,,	G	L.P.	0900-1400
VK5	,,	KH6		2000-1000
VK6	,,	W2		1500-1700, 2300
,,	,,	G	S.P.	0700-1500
,,	,,	G	L.P.	1000-1200
ZL	,,	W2		1700-2400
,,	,,	ZE		0600-1000
,,	,,	G	S.P.	1000-1400
,,	,,	G	L.P.	0800-1000

14 MHz.—

VK1/2	to	8P	S.P.	0300-0800, 1000-1500
,,	,,	8P	L.P.	0900-2400
,,	,,	VE3	S.P.	1400-2100
,,	,,	VE3	L.P.	1300-2400
,,	,,	W6		1600-2100, 0400-0600
,,	,,	ZS		1200-2300
,,	,,	PY		1800-2400, 0400-1200
,,	,,	VK6		2400-1200
,,	,,	VS6		0600-2000, 2200-2400
,,	,,	SU		0900-2400
VK3	,,	G	S.P.	0700-1700
,,	,,	G	L.P.	0900-1500
,,	,,	UA		0700-1500
,,	,,	JA		0500-1700, 2100-2300
,,	,,	W2		1300-2000
,,	,,	VK0		2000-1400
VK4	,,	5Z	S.P.	1400-2400
,,	,,	5Z	L.P.	0400-2100
,,	,,	W6		0400-0600, 1600-2100
,,	,,	PY		0400-1200, 1800-2200
,,	,,	G	S.P.	0700-1700
,,	,,	G	L.P.	0800-1200, 2100
VK5	,,	KH6		0500-1400, 1700-2200
VK6	,,	W2		1400-2400
,,	,,	G	S.P.	0900-1800
,,	,,	G	L.P.	0900-1600
ZL	,,	W2		1300-1900
,,	,,	ZS		0400-0600, 1300-2100
,,	,,	G	S.P.	0800-1700
,,	,,	G	L.P.	0200-0400, 0700-1000
				1600-2200

7 MHz.—

VK1/2	to	ZL		0800-1800
,,	,,	W6		0700-1600
,,	,,	G	S.P.	1400-2000
,,	,,	G	L.P.	0900
VK3	,,	JA		0900-2000
,,	,,	W2		0800-1400
,,	,,	VK6		1000-2000
,,	,,	VK0		0900-1900
,,	,,	8P		0900-1100
VK6	,,	ZS		1600-2200

Smoothed monthly sunspot number predictions for December 52, January 50, February 47, March 45.

Swiss Fed. Observatory, Zurich.

ARE YOU ORGANISED FOR THE NATIONAL FIELD DAY?

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With Syd Clark, VK3ASC

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"RADIO COMMUNICATION"

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July: Five-Band Conduction Cooled Linear Amplifier; Crystal Controlled AFSK Generator; RC Oscillators; Optimising the Super-regenerative Detector; Cooled Pre-amplifier for VHF/URF Reception; A Multi-Band QRP Transmitter; Using Y Parameters in RF Amplifier Design.

"73 MAGAZINE"

July: Modern VHF Counter, Part 2; Solid State VHF Amplifier; The Phase Locked Loop; VHF Converters; Add $15 T-Power; 1296 MHz. Mixer; Thick Film RF Pre-amplifier; Meteor Shower DXing; Tone Decoder and Carrier Relay Circuits; Flying Spot Scanner for SSTV; Active Filter Design, Part 2.

"QST"

August: A Single Conversion 2 Metre FM Receiver; A Twelve-Foot Stressed Parabolic Dish; The Mountaineer, an Ultra Portable Station; The Flashlight Sidebander; Antenna Switching and Transmatch Unit; Phased Verticals in a 40 Metre Beam-Switched Array; Why not use the Standard Values?; The Vest Pocket Logic Probe; A Two Metre Amplifier for Transceiver Users; Learning Morse.

WANTED

Left-Right Output Transformers for Bendix MN26 Radio Compass Receivers. Units are marked T16 or A15064. Pay $4 each if okay.
M. O'Brien, Edgar Rd., San Remo, Vic., 3925. Phone 107.

FOR SALE

Type A Mark 3 gear, 3-9 MHz., 6v. DC and 240v AC, key or phone Transceivers, cheap.
M. O'Brien, Edgar Rd., San Remo, Vic., 3925. Phone 107.

SILENT KEY

It is with deep regret that we record the passing of—

VK2AR—W. H. Hudson

L60001—E. Hardwick

St. George Y.R.C.S. Training Annex students and Instructors 1971/72. L. to R. back row are Godfrey and Noel Ericsson (Instructor), Don Sims, Barry Nivison-Smith, Major Cupit and Neville Muir. Front row students are James Truant, Mark Bookhardt, Nigel Cupit and Peter Fitzroy. Many honours were obtained, stated as a tribute to the Audio/Visual Training aids at the "Annex".

INTRUDER WATCH

With Alf Chandler, VK3LC

In Australia it is most difficult to get any reliable reports on identifications of r.t.t.y. or similar stations, of which there are many intruding into our Amateur bands, especially the 14 MHz. band. Just reports of "multiplex" are not of much use, because there are many types of "multiplex"—F2, F6, A7A are all "multiplex", but F1 r.t.t.y. with suitable gear can be often identified.

So far only one Observer has given me any worthwhile identifications by way of read-out of r.t.t.y. stations. Norm VK4NP has suitable gear and has been a tower of strength in this regard. His extensive read-outs of station **TCX** situated in Ankara, Turkey, have been very much appreciated. Unfortunately, this station was noted in my last month's report as having become silent. It has recently re-appeared testing (sending endless RYR, RYR) and transmitting to CWY in Uruguay, South America. How we can be misled!!

I know there are many more Amateurs in Australia with suitable r.t.t.y. gear who could take read-outs of intruder r.t.t.y. stations interfering with legitimate Amateur transmissions, and who could supply me with identifications of same. These are insidious intruders.

How about it? It would be most beneficial both from my point of view as Intruder Watch Co-ordinator, and from the points of view of all Amateurs to get reports flowing of these intruders before they classify themselves as "owning" the frequency which they are using.

These and other types of signals are urgently in need of identifying. Please do something!!

HAMADS

- **A free service for individual members.**
- **Four lines of print free (200 characters/spaces); full charge at $6 (min.) per col. inch if exceeded or for repeats: includes name/address—use QTHR if correct in Call Book.**
- **Copy, please in typescript if possible, and signed.**
- **Excludes commercial-class advertising.**
- **Exceptions only by PRIOR arrangement.**

For full details see January 1972 "A.R.." page 23.

FOR SALE

Melbourne, Vic.: FV101 external VFO for FT101, $75. SP-101P loudspeaker/phone patch for FT-101 or similar, $35. Both items brand new. Collins KWM-2 Transceiver in exceptional condition, $620. Extra heavy duty fully metered PSU for KWM-2, $40. VK3TD, Ph. (03) 787-1407 or QTHR.

Melbourne, Vic.: Hammarlund Super Pro Rx, AC and DC PSUs, excellent condition, $145. AR7 Rx, PSU and all coils, $60. VK3AQB Ph. (03) 337-4902.

Byron Bay, N.S.W.: Heathkit HW32A Transceiver, SS Power Supply, Microphone and Spkr., good condition, $150 o.n.o. VK2AFP, QTHR (7 Keats St.).

Moresby, P.N.G.: Heath HP13A, DC PSU, $50. Offers for SB102, SB600 and HP13A. T. Fishpool, VK9KE, C/o. Posts and Telegraphs, Port Moresby

Morwell, Vic.: Digital Freq. Counter, 5 digit Nixie readout, 0-200 MHz., neat constr., $200 o.n.o. VK3ZX, QTHR, Ph. (051) 40598.

Geelong, Vic.: Swan 350 Transceiver, 5 bands, complete with AC/DC PSU, spares available, good condition, little use, $400 o.n.o. VK3BFL/T, QTHR.

Sydney, N.S.W.: Modulation Transformer Woden UM1, 60 watts Class C, with data sheet, $5. VK2BAK, Ph. (02) 48-6241.

Sydney, N.S.W.: Trio 9R-59DE Rx, 0.55-30 MHz., volt. stab., not used, station inactive, new condition, original box, instruction book, etc., $120. VK2ZGS, Ph. (02) 34-8441 nights, week-ends.

Melbourne, Vic.: Several Communications Rx's for SWLs. Ring H. Roach, 28 Foster Ave., Glenhuntly, Vic. Ph. (03) 58-3757.

Melbourne, Vic.: Unitrex 1200 Electronic Desk Calculator, 12 digit, mains operated, $75. Dr. Lloyd, Ph. 698-6058 working hours only, after Dec. 11.

Melbourne, Vic.: Astatic Dynamic 10-DA, the only microphone engineered purely for SSB. Response 300-3000 Hz. Gives greatly increased talk power. Never used. Roth Jones, 1 Albert Rd., Melbourne, Vic., 3004.

Melbourne, Vic.: AR88D Communications Rx in mint condition, complete with original instruction book. Offers, Phone (03) 786-3980.

Melbourne, Vic.: National NCX-5, complete with PSU, $500. VK3ASC, QTHR, Ph. (03) 45-3002.

Melbourne, Vic.: 5-band SSB Transceiver, 100w. PEP output, Swan 500CX filter, hi-stab. VFO with 12 kHz. per knob rev., audio AGC, etc., etc. Complete and operating perfectly on 80 metres, requires instal. of coils and het. crystals (supplied) for other bands. Must sell, $100. AC PSU to match, $20. VK3ARZ, QTHR, Ph. (03) 232-9492.

Brisbane, Qld.: 10 new R.C.A. 6146B Tubes, $6 each incl. postage. 1-in. Vidicon, $14. 4CX250B, $8. Barneveld, 50 Withington St., East Brisbane, Qld., 4169. Mail only.

Burwood, Vic.: Home-brew SSB Xmtr. and PSU, 813 final, 10/80 mx, wkd. 200 countries, $60. VK3WM, QTHR, Ph. (03) 288-2180.

WANTED

Rokewood Junction, Vic.: Amateur bands only Rx, valved. Must be in very good condx. Not interested in Trio or Lafayette. Please write giving full relevant details/price asked. All replies answered. Box 1, Rokewood Junction, Vic., 3351.

Garvoc, Vic.: Heathkit Monitor Scope SBW610, also Hamscan. VK3XI, QTHR.

Sydney, N.S.W.: TV Yoke and magnetic focus magnet as per list on page 5 of March '72 "A.R." VK2BKG, QTHR, Ph. (02) 451-9435.

Dimboola, Vic.: Collins 51J1, 2, 3 or 4 Rx. Johnson Valiant or Ranger Tx. Must be clean condition with cabinets. VK3IB, QTHR.

Melbourne, Vic.: For private museum of early radio equipment: Ex R.A.A.F. Avro Anson HF Tx Rx type 1082 and 1083, Command Rx 1.5 to 3 MHz., output valve type VT38 (38233) suit R18 Rx, AR88D Rx Handbook. VK3AQB, Ph. (03) 337-4902.

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MULTIMETERS FOR AMATEURS

SPECIALS—CHECK THESE LOW PRICES

MODEL SK100: 100K O.P.V.

D.C. V.: 0.6, 3, 12, 60, 300, 600, 1,200.
A.C. V.: 6, 30, 120, 300, 1,200.
D.C. mA.: 0.012, 0.3, 6, 60, 600; 12A.
OHMS: 1 Ω to 20 MΩ in 4 ranges.
SIZE: 7" x 5¼" x 2½".
PRICE: **$30.40** + 15% sales tax.

MODEL SK7: 4K O.P.V.

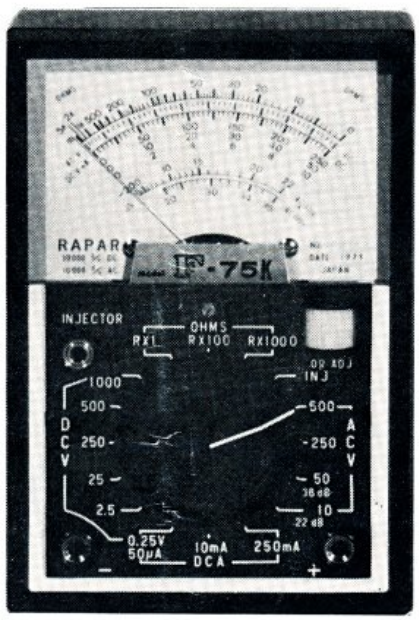
D.C. V.: 10, 50, 250, 1,000.
A.C. V.: 10, 50, 250, 500, 1,000.
D.C. mA.: O.25, 10, 250.
OHMS: 10 Ω to 2 MΩ in 2 ranges.
SIZE: 4⅞" x 3½" x 1½".
PRICE: **$8.80** + 15% sales tax.

MODEL M303: 30K O.P.V.

D.C. V.: 0.6, 3, 12, 60, 300, 1,200.
A.C. V.: 6, 30, 120, 300, 1,200.
D.C. mA.: 0.06, 6, 60, 600.
OHMS: 2 Ω to 8 MΩ in 4 ranges.
SIZE: 5¾" x 3¾" x 2".
PRICE: **$17.50** + 15% sales tax.

MODEL SK120: 20K O.P.V.

D.C. V.: 0.6, 3, 12, 60, 300, 1,200.
A.C. V.: 6, 30, 120, 300, 1,200.
D.C. mA.: 0.06, 6, 60, 600.
OHMS: 2 Ω to 8 MΩ in 4 ranges.
SIZE: 5¾" x 3¾" x 1¾".
PRICE: **$14.50** + 15% sales tax.



MODEL F75K: 30K O.P.V.

D.C. V.: 0.25, 2.5, 25, 250, 500, 1,000.
A.C. V.: 10, 50, 250, 500.
D.C. mA.: 0.05, 10, 250.
OHMS: 1 to 8 megohms in 3 ranges. Inbuilt Signal Injector.
PRICE: **$18.50** + 15% sales tax.

MODEL TP5SN: 20K O.P.V.

D.C. V.: 0.5, 5, 50, 250, 500, 1,000.
A.C. V.: 10, 50, 250, 500, 1,000.
D.C. mA.: 5, 50, 500.
OHMS: 0.5 MΩ in 4 ranges.
PRICE: **$15.00** + 15% sales tax.

MODEL 500B: 30K O.P.V.

D.C. V.: 0.25, 1, 2.5, 10, 25, 100, 250, 500, 1,000.
A.C. V.: 2.5, 10, 25, 100, 250, 500, 1,000.
D.C. mA.: 0.05, 5, 50, 500; 12A.
OHMS: 1 Ω to 8 MΩ in 3 ranges.
PRICE: **$25.00** + 15% sales tax.

MODEL MVA5: 20K O.P.V.

D.C. V.: 5, 25, 50, 250, 500, 2,500.
A.C. V.: 10, 50, 100, 500, 1,000.
D.C. mA.: 2.5, 250.
OHMS: 1-6 MΩ in 2 ranges.
SIZE: 4½" x 3¼" x 1⅛".
PRICE: **$12.00** + 15% sales tax.

MODEL TS-60R: 1K O.P.V.

D.C. V.: 15, 150, 1,000.
A.C. V.: 15, 150, 1,000.
D.C. mA.: 1, 150.
OHMS: 1K to 100K.
SIZE: 2¼" x 1¼" x 3½".
PRICE: **$6.75** + 15% sales tax.

SPECIAL CLEARANCE OF "MASTER" and "PATON" High Quality PANEL METERS at SPECIAL PRICES.

Write for "THIS MONTH'S SPECIALS" Components Price List!